TAMIL NADU
AGRICULTURAL UNIVERSITY

TWENTYTHIRD ANNUAL REPORT

April, 1993 to March 31, 1994

ACKNOWLEDGEMENT

The whole hearted support of the Chancellor, the Pro-Chancellor, the Chief Secretary and the Secretaries to the State and Central Governments is gratefully acknowledged. The guidance from the members of Board of Management, Academic Council, Research Council, Regional Research Councils and Extension Education Council was of immense help in identifying new horizons of thought and action.

Thanks are due to the Indian Council of Agricultural Research and World Bank for their liberal grants sanctioned for the various developmental programmes. The University is also thankful to the State Directorates of Agriculture, Oilseeds and Horticulture, Agricultural Marketing, State Cinchona Department, State Department of Forests, State Planning Commission, Khadi and Village industries Board, Government of India, Council of Scientific and Industrial Research, NABARD, Central Coir Board, Coffee Board, Ford Foundation, U.S.A., Department of Agriculture, U.S.A., International Food Policy Research Institute, U.S.A., International Foundation of Sciences, Sweden, Swedish, International Development Authority, International Atomic Energy Agency, Vienna, International Development Research Centre, Canada, UNICEF, Southern Petro Chemicals Industries Corporation Ltd., Madras and various private industries and institutions which have extended financial assistance to the University for undertaking research in specific areas.

It gives immense pleasure to acknowledge the help and co-operation rendered by the officers, teachers, scientists, students, technicians and administrative and supporting staff who have helped in the successful and efficient running of the University. The University considers it as a pride to thank the farming community, agro-industrialists and general public of Tamil Nadu. The continued support received by this University from the people of the State and functionaries at various levels will help to build this institution as a centre of excellence in agricultural research, education, extension and training.

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BOARD OF MANAGEMENT

Chairman and Acting Vice - Chancellor	:	Dr. C. Ramaswami, (From 17.3.93 to 3.8.93)
Chairman and Vice - Chancellor	:	Dr. S. Sankaran (From 4.8.93)
Secretary to Government, Agricultural Department and Agricultural Production Commissioner.	:	Thiru. G. Ranga Rao, I.A.S. (1.4.93 to 15.7.93)
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Member of Legislative Assembly	:	Thiru N. S. Palaniswamy, M.A. M.L.A.
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1. INTRODUCTION

The twentythird Annual Report of Tamil Nadu Agricultural University relates to the period from 1.4.1993 to 31.3.1994 and encompasses the significant developments and achievements in the field of education, research and extension education in Agriculture and allied fields. The various on-going programmes in Agriculture and allied disciplines were continued to give sufficient orientation to achieve the production and productivity of various agricultural and horticultural crops. Sixteen new crop varieties were released for general cultivation. New crop production and protection techniques were developed in the faculties of agriculture, horticulture, agricultural engineering and agroforestry. Special efforts were made to develop new cost effective management technologies and farm implements to reduce the cost of cultivation and to improve the efficiency of inputs. As in previous years, techno-economic studies were undertaken at district level covering cost of cultivation of major crops, employment of rural labour force and on several farming components like agriculture, horticulture, sericulture, dairying, nutrition etc. Special schemes were operated to train women in enterprise management to encourage their participation in rural development.

The research approach of the university is continued to be one of multidisciplinary and concentration was on applied research to solve field problems. The University took into consideration the emerging constraints such as limitation of land and water resources, increasing failures of monsoon and continuing population growth and formulated appropriate research programmes to achieve the set goals. The regionalisation of research already given importance was further strengthened through Regional Research and Extension Councils, Agroclimatic zone based research programmes, and formulation of time bound research sub projects. Apart from this the university also conducted the regional level farmers' day, field day, exhibitions and brought out many publications for the transfer of technology into the farmers' field.

Regional Research Councils and Scientific Workers' Conference provided ample opportunities for close interaction between research workers and extension staff. These were the major fora for identification of priority areas of research and also for faster dissemination of results generated during the year. The major areas of research that received greater focus include integrated nutrient management, integrated pest management, biotechnology, farming systems research, environmental science, dry farming, agroforestry, sericulture, water management, designing and development of new farm implements and tools, women participation and social engineering and

upliftment of scheduled castes and other backward communities. The educational programmes in both undergraduate and postgraduate courses were updated and refined to ensure a high degree of academic excellence.

The Directorate of Extension Education is responsible for the out reach programmes and transfer of technologies developed in various faculties to farmers. To carry out these functions, the Directorate of Extension Education has got several wings like communication centres, Krishi Vigyan Kendras, National Demonstration Units and Plant Clinic Centres located in various agro climatic regions of the state. The Krishi Vigyan Kendras train farm men, women and youths in Agriculture and allied fields through on-campus and off-campus training programmes. Similar to Krishi Vigyan Kendras, the National Demonstration Scheme and Plant Clinic Centres have facilities to train the farmers' of the surrounding areas. Communication centre helps in rapid transfer of information through print media, correspondence courses, Farm School on AIR, audio and video cassettes. The video library unit produces video lessons on different technologies developed in the university.

The training division offers training programmes in agriculture and allied fields. Agricultural Information Service wing of the Directorate convenes weekly meetings on Wednesdays involving identified scientists for immediate dissemination of the latest technologies. Mass media like radio, television, newspaper and farm magazine were utilised to spread new technologies for agricultural production and in allied fields as well. Apart from this, the university also conducts the regional level Farmers' Days, Field Days, exhibition etc. and brings out many publications for the transfer of technology to Tamil Nadu farmers.

A student counseling and placement centre is functioning in the University with the objective to provide information on curriculum advancement and helping them to secure good jobs. Coaching classes for competitive examination are organised. The Directorate of Extension Education also helped the farming community in weather forecast, agro-industry, soil, water, fertilizer and pesticides testing besides child care and nutrition services.

Thus, through the three pronged approach on Education, Research and Extension, Tamil Nadu Agricultural University is serving our State in the upliftment of economic status of the farmers at large. The contribution of the university through man power development, trainings, development of new crop varieties and technologies is substantial in all these year. The major achievements of the University in the field of education, research and extension - education during the year 1992-93 are summarised below:

Education

* During the year 371 students were admitted in the under-graduate programmes and 412 in the post-graduate courses in the four campuses of the University.

* M.Sc.(Ag.) degree course in Crop Physiology was revived at Agricultural College and Research Institute, Coimbatore.

* Tamil Nadu Agricultural University merit scholarship amount was enhanced to Rs.500/- from Rs.300/- per month from the Academic year 1993-94.

* The syllabi of all undergraduate and post-graduate programmes have been restructed and updated.

Research

During the year under report around 320 research schemes and 2300 research sub projects were in operation in the University.

The following new schemes were sanctioned and implemented during the year 1993-94.

University Plan Schemes

* Development of hybrid sesamum for irrigated uplands, Vridhachalam.

* Scheme for the development of rice fallow pulses for Nellai Kattabomman and Chidambaranar Districts, Ambasamudram.

* Development of maize varieties for industrial purposes, Bhavanisagar.

* Development of management practices for higher productivity in oil palm, Sirugamani.

* Source-Sink relationship for improving productivity in tapioca, Palur.

* Establishment of a model mechanised rice based farm in Cauvery Delta, Aduthurai.

* Management of pomegranate fruit borer, Coimbatore

* Management of phytonematodes through biocontrol and cultural practices in turmeric, Bhavanisagar.

- Scheme for research on arid zone fruit crops, Kumulur.
- Crop improvement in some bulbous ornamentals and standardisation of their cultural requirement for cut-flower production, Kodaikanal.
- Scheme for research on orchids and Anthuriums for export trade, varietal development, propagation management and commercialisation, Yercaud.
- Study on the salt encrustation problems in conveyance piper and measures to tackle them, Coimbatore
- Studies on processing and packing of mushrooms, Coimbatore.
- An assessment of potential for expanding production, processing and export of horticultural commodities. Coimbatore
- Study of potential and application of plasticulture in agricultural production, Coimbatore
- Shifting of Engineering College - Establishment of the departments viz., Farm Machinery, Soil and Water Conservation, Agricultural Structure and Bio-energy, Kumulur.

ICAR Schemes

- All India Co-ordinated Research Project on Subtropical fruits (mango), Periyakulam.
- All India Co-ordinated Research Project on Cotton, Periyakulam.
- All India Co-ordinated Research Project on pearlmillet, Coimbatore.
- All India Co-ordinated Research Project on groundnut, Vridhachalam, Aliyarnagar, Bhavanisagar, Tindivanam.
- Ecology of termites associated anaerobes and generation of greenhouse gases, Coimbatore.
- Screening of Gossypium sp. to reniform nematode and interaction with fungi, Coimbatore.
- Production of F.1 hybrids in ashgourd, pumpkin and bittergourd, Coimbatore.
- Soil microbiological studies in high value Horticultural Crops, Coimbatore.

* Evaluation of rice germplasm for biotic stresses, Aduthurai.
* Scheme for improvement of curry leaf, Coimbatore.
* Front line Demonstration of improved agricultural machineries for major pulse crops, Coimbatore.

Government of India Scheme

* Starting of experimental agromet service, Coimbatore.
* Crop pest control by plant derivatives, Coimbatore.
* Agro-forestry operation research project, Thanjavur.
* Comparitive evaluation and economic appraisal of different modes of application of drip systems, Coimbatore.
* Biological control approaches in the management of Parthenium hysterophorus, Coimbatore.
* Development of medicinal and aromatic plants, Kodaikanal, Vijayanagaram.
* Agroclimatic resource analysis for rice production in Cauvery Delta, Sirugamani.
* Regulatory mechanism of adsorption factor associated with anaerobic celluloytic bacteria, Coimbatore.

INTERNATIONAL COLLABORATIVE SCHEMES

* Study on the relationship between management authority and performance in tanks in Tamil Nadu, Coimbatore.
* Natural Resource economics, Coimbatore.
* Development of agro-forestry in Tamil Nadu, Coimbatore.
* Project simulation and system analysis for rice production, Aduthurai.
* Climate on rice production in India sub continent, Aduthurai.
* Variability and persistance of micro symbionts of Casuarina in relation to plantation productivity in India, Mettupalayam.

Private Agency Schemes

- Study of pest and disease infesting seed and seedlings of forestry crops and evolving suitable measures for their control, Mettupalayam.
- Methane flux management from paddy soil ecosystem, Coimbatore.
- Characterisation of a biobleaching enzyme and standardisation of production, Coimbatore.
- Studies on the bioecology and management of phytoparastic nematodes associated with mulberry, Coimbatore.
- Evaluation of long term effect on utilisation of effluent waster for irrigation, Coimbatore.
- Evaluation of textile mill effluent, Tirur
- Design and Development of a sprayer for areca, plantation, Coimbatore.
- Studies on the distillary effluent based compost and its utility, Coimbatore.
- Tunis rock phosphate, Coimbatore.
- Utilisation of biogas for heating and power generation, Coimbatore.
- Studies on low grade Udaipur rock phosphate, Coimbatore.
- Evaluation of raw bone meal as phosphotic source for crops of different soils, Coimbatore.
- Evaluation of SAN 6538 I 2509045 against cotton pest, Coimbatore.
- A socio-economic analysis of charcoal production in Tamil Nadu, Mettupalayam.
- Improvement of coffee processing equipment, Coimbatore.
- Influence of spraying system on the efficiency of insecticides against bollworms of cotton, Coimbatore.
- Endowment in botanical pesticides, Coimbatore.

State Government Schemes

- Consultancy projects, Coimbatore.
- Preparation of perspective plan for land use in Tamil Nadu, Coimbatore.
- Study on productivity per unit of water under various land use mixes, Coimbatore.

* Physiological strategies for maximising field establishment in tree species, Mettupalayam.

* Identification, isolation and multiplication of specific cross inoculation bio-fertilizers, Mettupalayam.

* Nutrient requirement of tree species in nursery, Mettupalayam.

* Watershed Development Component - Evaluation study, Coimbatore.

* Edible mushroom production in Nilgiris, Ooty.

Varieties released

Concerted efforts made by the Tamil Nadu Agricultural University scientists in different colleges and research stations have resulted in the release of 16 new varieties as "Pongal Gift" during January, 1994 for the benefit of the farming community.

The 16 varieties released are as follows:

Rice	:	Hybrid Rice CoRH 1
		ADT 42
		PMK 2
Sorghum	:	BSR 1
Tenai	:	Co 6
Hybrid Redgram	:	CoH 1
Blackgram	:	K1
Groundnut	:	ALR 2
		BSR 1
Coconut	:	VPM 3
Sugarcane	:	CoG 9407
Hybrid sapota	:	PKM 3
French Bean	:	YCD 1
Green Chilli	:	PLR 1
Turmeric	:	BSR 2
Betelvine	:	SGM 1

Apart from varietal improvement work, several crop management technologies were also developed for increasing the production and profit of the farmers. The most important ones are:

* Experiments conducted at Madurai revealed 80 kg/ha seed rate was sufficient to maintain optimum population in order to get higher grain yield in wet seeded lowland rice.

* The optimum level of N for direct seeded lowland rice ADT 36 was found to be 125 kg N/ha and for IR 20 rice at 150 kg N/ha. The increase in yield in ADT 36 and IR 20 were 425 kg/ha and 360 kg/ha respectively.

* Foliar spraying of fresh cowdung extract 20 per cent twice one at initial appearance of the disease and the other after 15 days was an effective as the standard recommendation of antibiotics in the management of bacterial leaf blight disease of rice.

* Prosopis leaf powder extract (10%), Ipomea leaf powder extract (10%) and neem oil (3%) were on par or next to NSKE (5%) in reducing sheath rot incidence and intensity.

* Application of Azospirillum and Phosphobacterium along with 75 per cent of the recommended level of N and P registered more grain yield in pearl millet WCC 75 and Cholam Paiyur 1 besides saving 25% of N and P under rainfed conditions.

* Seed inoculation of VPR 1, a slow growing rhizobium recorded better symbiosis and higher grain yield in CO 5 redgram. The average yield increase was 65.0% over untreated control under acid soils of Vamban.

* The pigeon pea hybrid ICPH 8 grown during kharif produced better quality seed than it did in summer. A planting ratio of 1:6 (male:female) and application of 30:60:20 kg NPK ha^{-1} was found optimum.

* The hybrid seeds of ICPH 8 can be processed using 11/64" sieve, dried to 8% moisture content and treated either with activated clay (10 g kg^{-1}) or Thiram (2 g kg^{-1}) and packed in 700 gauge polythene bag maintained 80% germination upto 8 months under combient conditions.

* The rhizobial strain COC 10 was found to be better than BMBS P 47 in increasing the grain yield of blackgram at Coimbatore.

* The study conducted at Vamban revealed that application of 20 kg K_2O/ha for rainfed pulses viz., cowpea, blackgram and greengram increased the yield to the tune of 30 per cent over control.

* Seed treatment with Trichoderma viride + Pseudomonas fluorescens (4 g/kg each) was superior to T. viride alone for control of root rot.

* Pre-emergence application of metalachlor (1.0 kg a.i/ha)+ one hand weeding on 30 DAS was found to be more profitable and economical for irrigated groundnut than conventional method of weed control.

* Sowing of groundnut in July delayed the appearance of late leafspot and increased the yield to 1400 kg/ha compared to August sowing.

* Increase in late leafspot by one grade decreased the yield by 200 kg/ha.

* In gingelly, combined treatment of T. viride and Azospirillum decreased the root rot incidence to 3.8% as against 19.5% in control.

* The best season for the production of BSH 1 sunflower hybrid seed was found to be May-August when perfect synchronisation occurs. A planting ratio of 1:4 and application of 90:90:90 kg NPK/ha are optimum to get higher yield (995 kg/ha) of good quality seeds.

* In multistoryed cropping system, banana and pineapple combination with coconut gave a net return of Rs.27,055/ha over and above the sole cropping. The cost benefit ratio was 1:4:2.

* The biofertilizer treated coconut palms recorded lesser disease intensity and higher nut yield when compared to control.

* Among various systems of irrigation, well irrigation recorded the maximum productivity per unit of water under various land use mixes.

* A simple on-farm technique for the accelerated ageing of freshly harvested rice has been developed.

* A quick method of composting the parthenium weed has been developed and perfected.

Transfer of Technology

The Directorate of Extension Education effectively and rapidly disseminated the research information developed at various centres to the farmers. A brief summary of the activities is presented below:

- The five Krishi Vigyan Kendras conducted on-campus and off-campus training programmes in agriculture and allied activities. A number of training programmes were conducted for the benefit of the farmers, farm women, extension workers, youths and other categories of personnel.

- The scientists of the five plant clinic centres diagnosed various crop maladies and suggested timely solution. Farm advisory services were organised besides conducting training, demonstrations, group meetings, field days and farmers' days.

- Communication centre offered lessons through Farm School on All Indian Radio and correspondence courses.

- New audio cassette lessons on crop cultivation were prepared and recorded cassettes were sold.

- The video production unit produced general programmes. Selected video lessons were duplicated and sold. Many programmes were telecast through Doordarshan Kendra.

- The training unit conducted training programmes benefiting participants of State Department of Agriculture, administrators, defence personnel, Scientists of Tamil Nadu Agricultural University etc.

- Students counseling and placement centre organised coaching classes for various competitive examinations, self employment training programmes for farm graduate, campus interviews and also provided information on employment opportunities.

- Timely and need based messages were processed and sent to the mass media and extension functionaries through agricultural information Service Centres.

Focus for 1994-95

Education

* Starting of new degree programmes with specialisation in identified areas.
* Introducing certificate course in agriculture.
* Restructuring of the syllabi and curricula of undergraduate and post graduate courses to suit the needs of various clientel group.

Research

* Developing high yielding, location specific crop varieties tolerant to biotic and abiotic stresses.
* Evolving high yielding, pest and disease tolerant rice varieties and hybrids.
* Development of hybrids in oilseeds and pulses
* Improvement of rice fallow pulses.
* Development of maize varieties for industrial purpose.
* Exploitation of bio-technology and genetic engineering for crop improvement.
* Strengthening breeder seed programme.
* Developing farming systems integrating animal husbandry and fisheries.
* Intensive efforts of microbial research and biofertilizers
* Dryland and wasteland development
* Efficient use of Agricultural and Industrial wastes.
* Identification of pollutants in specific situations inclusive of industrial pollutants and developing strategies to mitigate such problem.
* Intensification of research on water management.
* Post-harvest research in agricultural and horticultural crops.
* Research on fruit processing and fruit based products.

- Seed production, processing and storage techniques for vegetables.
- Intensification of research on dry farming and rainfed agriculture.
- Forestry Research including agro-forestry and farm forestry.
- Research on medicinal and aromatic plants
- Design and development of new farm implements and tools.
- Intensification of Research on bio-energy.
- Emphasis on plasticulture
- Developing integrated pest, disease, nutrient and weed management practices.
- Developing pest and disease management techniques through bio-control agents.
- Intensification of research on sericulture and apiculture.
- Remote sensing techniques for mapping endemic and epidemic areas of pests and diseases of crops.

Extension Education

- Bringing out required publications with timely information for the benefit of farming community.
- Starting of video school programme through Doordarshan Kendra.
- Conducting certificate courses for self employment of farm graduates.
- Special training programme in organic gardening and Horticultural Crops.
- Popularisation of Integrated Farming Systems and Integrated Pest Management.

2. UNIVERSITY ADMINISTRATION

OFFICERS OF THE UNIVERSITY

Chancellor	:	Dr. M. Channa Reddy His Excellency the Governor of Tamil Nadu
Pro-Chancellor	:	Thiru Ku.Pa. Krishnan Hon'ble Minister for Agriculture
Acting Vice-Chancellor	:	Dr. C. Ramaswami (For the period from 17.3.93 to 3.8.93)
Vice-Chancellor	:	Dr. S.Sankaran (From 4.8.93)
Registrar	:	Dr. C.Ramaswami
Director of Research	:	Dr. S.Chelliah (Upto 17.1.94) Dr. T.V. Karivaratharaju (From 17.1.94 A.N.)
Director of Extension Education	:	Dr. G.Perumal (Upto 17.1.94) Dr. J.Oliver (From 17.1.94 A.N.)
Dean (Agri.)	:	Dr. S.Sankaran (Upto 3.8.93) SP.Palaniappan (4.8.93 to 17.1.94) Additional charge Dr. S.Kannaiyan (From 17.1.94 A.N.)
Dean (P.G.Studies)	:	Dr. M.Gopalan (Upto 17.1.94) Dr. N.M.Ramaswamy (From 17.1.94 A.N.)
Dean, College of Agrl. Engg., Coimbatore	:	Prof. K.R.Swaminathan (Upto 17.1.94)
Dean, College of Agrl. Engg., Kumulur	:	Dr. D.Chandrasekaran (From 27.1.94 F.N.)
Dean, Horticultural College and Research Institute, Coimbatore	:	Dr. I.Irulappan (Upto 17.1.94)

Dean, Horticultural College and Research Institute, Periyakulam	:	Dr. R. Arumugam (Upto 17.1.94) Dr. S.Sambandamurthi (From 17.1.94 A.N.)
Dean (Forestry), Forest College and Research Institute, Mettupalayam		Thiru R. Annamalai, I.F.S.
Dean, Agrl College and Research Institute, Madurai	:	Dr. G. Soundarapandian (Upto 17.1.94) Dr. S.Purushothaman (From 17.1.94 A.N.)
Dean, Agrl College and Res. Instt., Killikulam	:	Dr M Rangarajan (Upto 17.1.94) Dr.S. Rajasekaran (From 17.1.94 A.N.)
Dean, Agrl. College and Res. Instt., Tiruchirappali	:	Dr. T.S. Manickam (From 17.1.94 A.N.)
Director, School of Genetics, Tamil Nadu Agricultural University, Coimbatore - 3	:	Dr A Narayanan (Upto 31.7.93) Dr. S. R Sreerangasamy (From 1.8.93 to 17.1.94) (Additional charge) Dr M. Rangaswamy (From 17.1.94 A.N.)
Director, Soil and Crop Management Studies	:	Dr. SP Palaniappan (Upto 17.1.94) Dr. A. Balasubramanian (From 17.1.94 A.N.)
Director, Centre for Plant Protection Studies	:	Dr. P. Vidyasekaran (Upto 17.1.94) Dr. M. Gopalan (From 17.1.94 A.N.)
Director, Centre for Agricultural and Rural Development Studies	:	Dr. V. S. Subramanyan (Upto 17.1.94) Dr. S. R. Subramanian (From 17.1.94 A.N.)
Director, Water Technology Centre, Tamil Nadu Agricultural University, Coimbatore.	:	Dr. A. Rajagopal (Upto 17.1.94) Dr. A. Mohamed Ali (From 17.1.94 A.N.)
Director, Centre for Plant Molecular Biology, Tamil Nadu Agricultural University, Coimbatore.	:	Dr. S. R. Sree Rangasamy (Upto 17.1.94) Dr. S. Sadasivam (From 17.1.94 A.N.)

Director, Planning and Monitoring, Tamil Nadu Agricultural University, Coimbatore - 3.	: Dr. K. M. Ramanathan (Upto 17.1.94)
Director, Tamil Nadu Rice Research Instt. Aduthurai.	: Dr. A. Abdul Kareem (Upto 17.1.94) : Dr. T. B. Ranganathan (From 17.1.94 A.N.)
Director of Publication	: Dr. A. Rajagopal (From 17.1.94 A.N.)
Director of Student Welfare	: Dr. R. Sethupathy Ramalingam (From 17.1.94 A.N.)
Estate Officer	: Prof. K. R. Swaminathan (Upto 25.4.93) (Additional Charge) : Th. V. Angamuthu (From 26.4.93)
Comptroller	: Th. G. Srinivasan (Upto 31.8.93) : Dr. A. Rajagopal (From 1.9.93 to 3.12.93) (Additional Charge) : Th. G. Shanmugasundaram (From 4.12.93)

BOARD OF MANAGEMENT

Chairman and Acting Vice - Chancellor	: Dr. C. Ramaswami, (From 17.3.93 to 3.8.93)
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Director of Agriculture	: Th. N. Govindan, I.A.S.

Director of Animal Husbandry,	:	Dr. S. P. Anbumani
Director of Fisheries (Commissioner of Fisheries)	:	Tmt. Latika D. Padalkar, I.A.S.
Principal Chief Conservator of Forests	:	Thiru M. Harikrishnan, I.F.S.
Agrl. Scientist	:	Dr. S. K. Sinha
Crop Farmer	:	Vacant
Livestock Farmer	:	Thiru A. M. A. Wahab
Agro Industries	:	Thiru. S. Marimuthu
Woman Social Worker	:	Dr. (Mrs.) Godavari Kamalanathan
Educationist	:	Dr. V. D. Guruswamy Raja
ICAR Nominee	:	Dr. I. P. Abrol (From 24.6.93)
Member of Legislative Assembly	:	Thiru N. S. Palaniswamy, M.A. M.L.A.
Member Secretary Registrar	:	Dr. C. Ramaswami

MEETINGS OF THE BOARD OF MANAGEMENT

During the year 1993 - 94, the Board of Management met thrice on 9.7.93, 18.10.93 and 17.1.94.

The following were the some of the decisions taken by the Board of Management at these Meetings.

1. The Board noted for information the enhancement of the Tamil Nadu Agricultural University Merit Scholarship amount for Post-graduate students from Rs. 200/- to Rs. 500/- p.m from 1993 - 94.

2. The Board noted the information the Government order for the implementation of New Plan Schemes during the year 1993 - 94.

3. The Board permitted the University to accept one LAPTOP Computer costing Rs.94,000/- as donation offered by the Project Leader, IRRI, Philippines under SARP Programmes.

4. Approved the guidelines proposed as norms for starting Diploma Course in Agriculture having 40 - 50 students as admission strength as placed before the Board.

5. Approved and ratified the action of the University in having increased the admission strength in the under - graduate courses during 1992 - 93 by 10% in accordance with G.O. Ms. No. 999 Edn. Department dt. 27.10.92 for CBSE Students.

6. Approved and ratified the action of the University in having permitted the Dean, Pandit Jawaharlal Nehru College of Agriculture, Karaikkal to increase the admission strength for the B. Sc.(Ag.) Degree course from 50 to 60 seats (20%) from the academic year 92 - 93 on par with the other professional and Arts Colleges in the Union territory of Ponidcherry.

7. The Board deferred the admission of SRFS/Res. Associates for doing Ph.D. under part - time basis from the academic year 1992 - 93.

8. The Board approved and ractified the action of the University in having increased the cost of Under - graduate application forms including B.Sc. (H.Sc.) Course.

9. Approved the implementation of Inter - University Collaborative Research Project with the Madurai Kamaraj University and also suggested that the University may enter into a Memorandum of understanding on specific objectives and activities.

10. Recommended the proposal to the Government to bring 292 Casual laborers as Mazdoors on consolidated pay (150 persons in the current year 1993 - 94 and the remaining 142 persons in the next year 1994 - 95).

11. Approved the admission strength in M.Sc. (Bio-Technology) from 12 to 20 seats during 1993-94. It is also decided to maintain the same level of admission strength from 1994-95 onwards.

12. Approved the admission of five inservice candidates of Marathwada Agricultural University in Ph.D. for Course work in Tamil Nadu Agricultural University under faculty upgradation programme.

13. Approved the admission of ten Government of India nominees under ICAR Quota in B.E. (Ag.) degree programme during 1993-94 as against four seats subject to the condition that these extra six seats involved shall be over and above the admission strength.

14. Approved the institution of an endowment entitled "IRRI - ADB Endowment on Botanical Pesticides" by utilising the savings of Rs.4,43,899 from the scheme for conduction research on Botanical pesticides.

15. Accepted the recommendation of the Academic Council not to consider the request of the affiliated Institutions for Sanction of Management Quota.

16. The Board noted for information the time frame fixed by the University for the completion of Research Programmes.

17. The Board noted for information the Government orders reducing the minimum OGPA as 3.20/4.00 for recruitment in the University for the Post of Asst.Professor irrespective of Community and also approved the incorporation of the above amendments in the Regulations of the University.

ACADEMIC COUNCIL

Chairman and Acting Vice - Chancellor	:	Dr. C. Ramaswami, (From 17.3.93 to 3.8.93)
Chairman and Vice - chancellor	:	Dr. S. Sankaran (From 4.8.93)

MEMBERS

Secretary to Government, Agriculture (AU) Department and Agricultural Production Commissioner.	:	Thiru. G. Ranga Rao, I.A.S. (upto to 15.7.93)
Secretary to Government, Agricultural Department	:	Th. R. C. Panda, I.A.S. (From 16.7.93)
Dean, Agrl. College and Research Instt. Coimbatore.	:	Dr. S.Sankaran (Upto 3.8.93) SP.Palaniappan (4.8.93 to 17.1.94) (Additional Charge) Dr. S.Kannaiyan (From 17.1.94 A.N.)
Dean, Post - Graduate Studies, Tamil Nadu Agricultural University, Coimbatore.	:	Dr. M.Gopalan (Upto 17.1.94) N.M.Ramaswamy (From 17.1.94 A.N.)

Dean, Horticultural College and Research Institute, Coimbatore.	:	Dr. I.Irulappan (Upto 17.1.94)
Dean, Horticultural College and Research Institute, Periyakulam.	: :	Dr. R. Arumugam (Upto 17.1.94) Dr. S.Sambandamurthi (From 17.1.94 A.N.)
Dean, College of Agrl. Engineering, Tamil Nadu Agricultural University, Coimbatore.	:	Prof. K. R. Swaminathan (Upto 17.1.94)
Dean, College of Agrl. Engineering., Kumulur.	:	Dr. D. Chandrasekaran (From 27.1.94)
Dean, Forest College and Research Institute, Mettupalayam.	:	Thiru. R. Annamalai, I.F.S.
Dean, Agrl. College and Research Institute, Madurai	: :	Dr. G.Soundarapandian (Upto 17.1.94) Dr.S. Purushothaman (From 17.1.94 A.N.)
Dean, Agrl. College and Res. Instt., Killikulam	: :	Dr. M.Rangarajan (Upto 17.1.94) Dr.S. Rajasekaran (From 17.1.94 A.N.)
Dean, Agrl. College and Res. Instt., Tiruchirappali	:	Dr.T.S. Manickam (From 17.1.94 A.N.)
Dean. Pandit Jawaharlal Nehru College of Agriculture, Karaikkal.	:	Dr. A. Gopalswamy
Director of Research, Coimbatore	: :	Dr. S. Chelliah (Upto 17.1.94) Dr. T. V. Karivaratharaju (From 17.1.94 A.N.)

Director of Extension Education	: Dr. G. Perumal (Upto 17.1.94) : Dr. J. Oliver (From 17.1.94 A.N.)
Director, School of Genetics, Coimbatore.	: Dr A Narayanan (Upto 31.7.93) : Dr S R Sreerangasamy (From 1.8.93 to 17.1.94) (Additional charge) : Dr M Rangaswamy (From 17.1.94 A.N.)
Director, Centre for Agricultural and Rural Development Studies Coimbatore.	: Dr V. S. Subramanyan (Upto 17.1.94) : Dr S R Subramanian (From 17.1.94 A.N.)
Director, Centre for Plant Protection Studies Tamil Nadu Agricultural University Coimbatore.	: Dr. P. Vidyasekaran (Upto 17.1.94) : Dr M.Gopalan (From17.1.94 A.N.)
Director, Water Technology Centre, Tamil Nadu Agricultural University, Coimbatore.	: Dr. A. Rajagopal (Upto 17.1.94) : Dr. A. Mohamed Ali (From 17.1.94 A.N.)
Director, Soil and Crop Management Studies Tamil Nadu Agricultural University, Coimbatore.	: Dr. SP. Palaniappan (Upto 17.1.94) : Dr. A. Balasubramanian (From 17.1.94 A.N.)
Director, Centre for Plant Molecular Biology, Tamil Nadu Agricultural University, Coimbatore.	: Dr S R Sree Rangasamy (Upto 17.1.94) : Dr. S. Sadasivam (From 17.1.94 A.N.)
Director, Planning and Monitoring, Tamil Nadu Agricultural University, Coimbatore.	: Dr. K. M. Ramanathan (Upto 17.1.94 A.N.)
Director, Tamil Nadu Rice Research Institute Aduthurai.	: Dr. A. Abdul Kareem (Upto 17.1.94) : Dr. T. B. Ranganathan (From 17.4.94 A.N.)

Director of Publication, Coimbatore.	:	Dr. A. Rajagopal (From 17.1.94 A.N.)
Director , Students Welfare, Coimbatore.	:	Dr. R. Sethupathy Ramalingam (From 17.1.94 AN)
Six members from among the Heads of Departments nominated by the Vice - Chancellor.	:	i. Dr. M. Balasubramanian, Professor and Head, Department of Farm Machinery, College of Agrl. Engineering, Tamil Nadu Agricultural University, Coimbatore (22.11.92)
		ii. a. Dr. S. Sadasivam Prof. and Head, Department of Bio-Chemistry, Tamil Nadu Agricultural University, Coimbatore.
		b. Dr. S. Neelakantan, Prof. and Head, Department of Food Science and Nutrition, Agricultural College and Research Institute, Madurai. (From 15.2.94)
		iii. Dr. P. C. Sundara Babu, Prof. and Head, Department of Agrl. Entomology, Tamil Nadu Agricultural University, Coimbatore. (From 22.11.92)
		iv. Dr. C. Surendran, Prof. and Head, Forest College and Research Instt., Mettupalayam (From 22.11.92)

Dr. S. Thamburaj,
Prof. and Head,
Department of Olericulture,
Horticultural College and Research Institute,
Tamil Nadu Agricultural University,
Coimbatore. (From 22.11.92)

Dr. V. Veerabadran,
Prof. and Head,
Dept. of Agronomy,
Agrl. College and Res. Instt.,
Killikulam,
Vallanadu,
VOC. District (From 22.11.92)

Three Members having special knowledge on practical experience in different aspects of Agriculture nominated by the Vice - Chancellor

1. Dr. T. P. Ojha,
Deputy Director General,
(Agrl. Engg.,)
Indian Council of Agrl. Research,
Dr. Rajendra Prasad Road,
Krishi Bhavan,
New Delhi - 110 001 (From 22.11.92)

2. Dr. Anupam Varma
Head,
Division of Mycology and Plant Pathology
Indian Agricultural Research Instt.,
New Delhi - 110 012. (From 22.11.92)

3. Dr. B. S. Chundawat,
Principal and Dean,
Aspee College of Forestry and Horticulture,
Gujarat Agrl. University,
Navsari Campus,
Navsari - 396 450.
Gujarat State (From 22.11.92)

Meetings of the Academic Council:

The Academic Council met twice during the period under report. The following important decisions were taken.

1. Approved the enhancement of Tamil Nadu Agricultural University Merit Scholarship from Rs.200/- to Rs.500/- for Post-graduate students from the Academic year 1993-94 onwards as per G.O.Ms.No.805 Agri (AU) Department dt. 28.12.92.
2. Approved the fixing up of admission strength for the Post-graduate degree programmes for the year 1992-93.
3. Accepted the Government orders deputing 8 Officers from the Department of Agriculture and Horticulture for admission to Ph.D. Programmes.
4. Accepted the increase in seats in Under-graduate admission 1992-93 based on G.O.Ms.No.999 of Education (V.3) Department dated 27.10.92.
5. Accepted the reservation of 8 seats in M.E.(Ag.) for the Officers deputed from the Agrl. Engineering Department.
6. Accepted the Educational concession to converts of Christianity from Vanniyakula Kshathriya including its synomyms-classified as MBC from the academic year 1993-94.
7. Approved the admission of an ICAR sponsored candidate to join Ph.D.(Horticulture) Course during the II Semester of 1991-92.
8. Accepted the proposal of conducting special Mid-Semester test for four students sponsored by the Sugar Mills.
9. Approved the increase of admission strength for the B.Sc.(Ag.) degree course from 50 to 60 seats from the academic year 1992-93 in Pandit Jawaharlal Nehru College of Agriculture, Karaikal.
10. Approved the nomination of a person to the Committee which is to recommend a panel of names to the Chancellor for the appointment of Vice-Chancellor of Tamil Nadu Agricultural University.
11. Examined the report on the affiliation of Thanthai Roever Institute of Agriculture and Rural Development, Perambalur, Tiruchirapalli District to Tamil Nadu Agricultural University for offering two year Diploma Course in Agriculture.

2. Dr. C.Raja Reddy,
Principal,
Sri Venkateshwara Agrl. College,
Tirupathi - 517 502.

The Board of studies (Post-graduate Education) met once during the year under report and recommended the following to the Academic Council.

1. Numbering of the Course Topical Research as 871 for Ph.D. programme
2. Minimum requirement for a pass in a subject
3. Permissible credit load for M.Sc and Ph.D.
4. Transfer of credits for Ph.D
5. Missing test rule to be included
6. Minimum GPA requirement for Ph.D.
7. Revival of M.Sc.(Ag.) in Crop Physiology at Coimbatore
8. Permitting candidates in the disciplines of Farming system Management, Plant Protection, Sugarcane production and Water management to do Ph.D.
9. Preparation of report cards for M.Sc. and Ph.D. in Computer Sheets.

FACULTY OF AGRICULTURE

Dean (Agri.)	:	Chairman
Deans of other Faculties and All Deans within the Faculty	:	Members
Heads of Departments within the Faculty	:	Members
All the Professors of the Faculty	:	Members

ELECTED MEMBERS:

1. Dr. C.R.Vijayaraghavan,
Associate Professor,
Agrl. Res. Station,
Viringipuram,
North Arcot Ambedkar District,
Vellore - 632 104.

2. Dr. N.Natarajan,
   Associate Professor,
   Department of Agrl. Botany,
   Agrl. College and Research Institute,
   Madurai - 625 104.

ASSISTANT PROFESSORS:

1. Thiru P.Nasurudeen,
   Asst. Professor,
   Office of the Dean,
   Agrl. College and Res. Instt.,
   Coimbatore - 3.

2. Thiru C.R.Anandakumar,
   Asst. Professor,
   Agrl. Research Station,
   Kovilpatti.

3. Thiru M.Subash Chandra Bose,
   Asst. Professor,
   Dept. of Forage Crops,
   Agrl. College and Res. Instt.,
   Coimbatore.

4. Thiru A.Balraj,
   Asst. Professor of Physics,
   Department of Agrl. Engineering,
   Agrl. College and Res. Instt.,
   Killikulam,
   Vallanadu Post,
   V.O.C. District.

NOMINATED MEMBERS - OUTSIDE EXPERTS

1. Dr. V.Gopinathan Nair,
   Prof. and Head,
   Dept. of Plant Breeding and Genetics,
   College of Agriculture,
   Vellayani,
   Trivandrum.

2. Dr. M.Santharam,
Prof. and Head,
Dept. of Soil Science and Agrl. Chemistry,
Andhra Pradesh Agrl. University,
Rajendranagar,
Hyderabad - 500 030.

The Board of Studies (Agriculture) met once during the year under report and recommended the following to the Academic Council.

1. Approval of third year standing semester syllabus for B.Sc.(Agri.) degree programme.

2. Revision of fee for issue of duplicate transfer, conduct, report card and Provisional Certificates

FACULTY OF HORTICULTURE:

Dean (Horticulture)	:	Chairman
Deans of other Faculties and All Deans within the Faculty	:	Members
Heads of Departments within the Faculty	:	Members
All the Professors of the Faculty	:	Members

ELECTED MEMBERS:

1. Thiru S.Balasubramanian,
Associate Professor,
Agrl. College and Res. Instt.,
Navalurkuttapattu,
Tiruchirapalli - 20.

2. Thiru V.Ponnuswamy,
Professor,
Dept. of Olericulture,
Horticultural College and Research Institute,
Coimbatore - 3.

ASSISTANT PROFESSORS:

1. Tmt. D.Sarala Devi,
   Asst. Professor (Horticulture),
   Horticultural College and Research Institute,
   Periyakulam.

2. Thiru M.Selvarajan,
   Asst. Professor (Horticulture),
   Sugarcane Research Station,
   Sirugamani.

3. Thiru L.Puhazhendi,
   Asst. Professor (Horticulture),
   Department of Olericulture,
   Horticultural College and Research Institute,
   Coimbatore - 3.

4. Thiru M.Kannan,
   Asst. Professor (Horticulture),
   Horticultural Research Station,
   Kodaikanal.

NOMINATED MEMBERS - OUTSIDE EXPERTS

1. Dr. M.N.Khan,
   Professor and Head,
   Division of Horticulture,
   University of Agricultural Sciences,
   GKVK Campus,
   Bangalore - 560 065.

2. Dr. V.Suryanarayana,
   Professor and Head,
   Dept. of Horticulture,
   Sri Venkateshwara Agrl. College,
   Tirupati - 517 503,
   Andhra Pradesh.

The Board of Studies (Horticulture) met once during the year under report and recommended the following to the Academic Council.

1. Approval of third year standing semester syllabus for B.Sc. (Horticulture).

2. Approval of the syllabus for HOR.209, HOR.310 and HOR.311 to be offered to B.Sc.(Ag.) and HOR.312 for B.Sc.(Home Science)

3. Approval of III Year Semester syllabus for B.Sc.(Home Science)

4. Getting of separate set of question papers for the B.Sc.(Horticulture).

FACULTY OF FORESTRY

Dean (Forestry)	Chairman
Deans of other Faculties and All Deans and Directors in the Main Campus	Members
Registrar	Member
All Professors in the Faculty of Forestry	: Members

ELECTED MEMBERS:

ASSOCIATE PROFESSORS

1. Dr. V.Murugappan,
   Associate Professor,
   Forest College and Res. Institute,
   Mettupalayam - 641 301.

2. Thiru K.L.Chellapillai,
   Associate Professor,
   Forest College and Res. Institute,
   Mettupalayam - 641 301.

ASSISTANT PROFESSORS:

1. Thiru R.Narayanan,
   Asst. Professor,
   Forest College and Res. Instt.,
   Mettupalayam - 641 301.

2. Thiru V.Chellamuthu,
   Asst. Professor,
   Forest College and Res. Instt.,
   Mettupalayam - 641 301.

NOMINATED MEMBERS - OUTSIDE EXPERTS:

1. Thiru G.Kumaravelu, I.F.S.
   Conservator of Forests (Researcl ,
   Southern Forest Rangers College
   Coimbatore - 641 002.

2. Dr. S.Chand Basha, I.F.S.
   Director,
   Kerala Forest Research Institute,
   Peechi Post,
   Tirussur District,
   KERALA.

The Board of Studies (Forestry) met once during the year under report and recommended the approval of the III Year standing Semester Syllabus of B.Sc.(Forestry) programme to the Academic Council.

FACULTY OF AGRICULTURAL ENGINEERING:

Dean (Agrl. Engineering)	:	Chairman
Deans of other Faculties and all Deans within the Faculty	:	Members
All Heads of Departments and all Professors in faculty of Agrl. Engineering	:	Members

ELECTED MEMBERS

ASSOCIATE PROFESSORS

1. Thiru V.Murugesan,
   Professor,
   Department of Bio-Energy,
   College of Agrl. Engineering,
   Coimbatore - 641 003.

2. Thiru M.Koteeswaran,
   Professor,
   Soil and Water Conservation,
   College of Agrl. Engineering,
   Coimbatore - 641 003.

ASSISTANT PROFESSORS

1. Thiru D.Palaniswamy,
   Asst. Professor,
   College of Agrl. Engineering,
   Soil and Water Conservation,
   Tamil Nadu Agrl. University,
   Coimbatore - 3.

2. Thiru I.Seegan Paul,
   Asst. Professor (Agrl. Engg.),
   Agrl. College and Res. Instt.,
   Killikulam,
   Vallanad Post,
   V.O.C. District.

3. Thiru D.Manohar Jesudass,
   Asst. Professor,
   Dept. of Farm Machinery,
   College of Agrl. Engineering,
   Coimbatore - 3.

4. Thiru K.Kathirvel,
   Asst. Professor,
   Agrl. College and Res. Instt.,
   Killikulam,
   Vallanad Post,
   V.O.C. District.

NOMINATED MEMBERS - OUTSIDE EXPERTS

1. Dr. C.P.Singh,
   College of Agrl. Engineering,
   Punjab Agricultural University,
   Ludhiana.

2. Dr. Nawab Ali,
   ICAR Scientist,
   Central Institute of Agrl. Engineering,
   Bhopal.

The Board of Studies (Agrl. Engg) met once during the year under report and recommended the following to the Academic Council.

1. Approval of syllabus content of the V and VI Semesters of B.E.(Ag.) degree programme
2. Admission of 5 to 10 Diploma holders in Agrl. Engineering in B.E.(Ag.) degree programme
3. Proposal of a few Mathematics Courses as obligatory for M.E.(Ag.) and Ph.D.(Agrl. Engg.) students.

COURSES AND CURRICULA:

A total number of 13,128 application forms for the degree courses in Agriculture, Horticulture, Forestry, Agricultural Engineering and 148 applications for B.Sc.(Home Science) were received.

The following are the different programmes in the University.

DEGREE	SUBJECTS
B.Sc.(Ag.)	Agriculture
B.Sc.(Hort.)	Horticulture
B.E.(Ag.)	' Engineering
B.Sc.(Forestry)	/
B.Sc.(Home Science)	'lome Science
Ph.D. & M.Sc.(Ag.)	Crop Physiology
Ph.D. & M.Sc.(Ag.)	Agrl. Microbiology
Ph.D. & M.Sc.(Ag.)	Plant Pathology
Ph.D. & M.Sc.(Ag.)	Agrl. Entomology
Ph.D. & M.Sc.(Ag.)	Seed Technology
Ph.D. & M.Sc.(Ag.)	Agrl. Extension
Ph.D. & M.Sc.(Ag.)	Agrl. Economics
Ph.D. & M.Sc.(Ag.)	Soil Science and Agrl. Chemistry
Ph.D. & M.Sc.(Ag.)	Plant Breeding and Genetics.
Ph.D. & M.Sc.(Hort.)	Horticulture
Ph.D. & M.Sc.(Ag.)	Agronomy
M.Sc. (Ag.)	Sugarcane Production
M.Sc. (Ag.)	Farming System Management
M.Sc. (Ag.)	Plant Protection
M.Sc. (Ag.)	Agrl. Marketing Management
Ph.D. & M.Sc.(Ag.)	Plant Namatology

M.Sc. (Ag.)	Water Management
Ph.D. & M.E.(Ag.)	Bio-Energy
Ph.D. & M.E.(Ag.)	Farm Power and Machinery
Ph.D. & M.E.(Ag.)	Soil and Water Conservation Engineering
Ph.D. & M.E.(Ag.)	Agrl. Processing
M.E.(Ag.)	Water Management
M.Sc. & Ph.D.	Food Science and Nutrition
M.B.M.	Master of Business Management
Ph.D. & M.Sc.	Bio-Technology
Ph.D. & M.Sc.	Environmental Science
Ph.D. & M.Sc.	Forestry
M.Sc.	Sericulture
P.G.	Diploma Sericulture

The candidates selected for various undergraduates and Postgraduates degree programmes were approved by the Vice-Chancellor.

During the years under report, number of students passed out and admitted in the different undergraduate degree programmes are furnished below:

Name of the Degree Programme	No. of students passed out	No. of students admitted
B.Sc.(Ag.)	321	280
B.Sc.(Hort.)	45	32
B.E.(Ag.)	87	21
B.Sc.(Home Science)	12	18
B.Sc.(Forestry)	13	20
Total:	478	371

POST-GRADUATE EDUCATION:

Following are the number of post-graduate students passed out and admitted during the period under report:

Name of the Programme	No. of students passed out	No. of students admitted
COIMBATORE CAMPUS:		
I. M.Sc. (Ag.)		
1. Agronomy	2	10
2. Plant Breeding & Genetics	2	14
3. Agricultural Entomology	1	8
4. Soil Science and Agrl. Chemistry	–	10
5. Agricultural Economics	1	8
6. Agricultural Extension	1	9
7. Agricultural Microbiology	–	11
8. Seed Technology	–	18
9. Crop Physiology	–	–
10. Agrl. Marketing Management	–	4
11. Plant Protection	1	–
12. Plant Pathology	1	10
13. Sugarcane Production	4	4
14. Farming System Management	–	–
15. Plant Nematology	1	4
16. Water Management	–	–

	Name of the Programme	No. of students passed out	No. of students admitted
II.	**M.Sc. (Horticulture)**	–	23
III.	**M.E.(Ag) / Engineering**		
	Farm Power and Machinery	–	6
	Soil and Water Conservation	–	7
	Bio-Energy	–	5
	Agrl. Processing	1	12
	Water Management	–	3
IV.	Master of Business Management	1	10
V.	M.Sc.(Bio-Technology)	–	8
VI.	M.Sc.(Environmental Sciences)	–	5
VII.	Post-graduate Diploma in Sericulture	–	9
VIII.	M.Sc.Sericulture	–	10
MADURAI CAMPUS:			
1.	Agronomy	1	10
2.	Plant Breeding & Genetics	–	10
3.	Agrl. Entomology	–	5
4.	Soil Science & Agrl. Chemistry	–	5
5.	Agrl. Microbiology	–	4
6.	Agrl. Economics	–	3
7.	Agrl. Extension	–	16
8.	Plant Pathology	–	6
9.	Crop Physiology	–	7
10.	M.Sc.(Food Science & Nutrition)	–	4

Name of the Programme	No. of students passed out	No. of students admitted
KILLIKULAM CAMPUS:		
1. Plant Breeding & Genetics	--	5
2 Agrl. Entomology	–	5
3 Soil Science & Agrl Chemistry	--	3
4 Agrl Economics	–	3
5. Agrl. Extension	–	6
6. Agronomy	–	8
PERIYAKULAM :		
1. Horticulture	–	5
METTUPALAYAM:		
1. Forestry	–	6
DOCTORAL PROGRAMME - Ph.D.		
COIMBATORE CAMPUS:		
FACULTY OF AGRICULTURE		
1. Agronomy	9	9
2. Plant Breeding & Genetics	10	8
3. Agrl. Entomology	5	12
4. Soil Science & Agrl. Chemistry	27	9
5. Agrl. Extension	1	2
6. Agrl. Microbiology	–	1
7. Crop Physiology	3	–

	Name of the Programme	No. of students passed out	No. of students admitted
8.	Seed Technology	1	5
9.	Plant Pathology	1	6
10.	Agrl. Economics	–	9
11.	Econometrics	1	–
12.	Environmental Sciences	–	2
13.	Plant Nematology	–	2
14.	Biotechnology	–	4
15.	Forestry	–	2
AGRICULTURAL ENGINEERING			
1.	Farm Power and Machinery	–	1
2.	Soil and Water Conservation	–	1
3.	Bio-Energy	–	1
4.	Agrl. Processing	–	4
HORTICULTURE		4	7
MADURAI CAMPUS			
1.	Agronomy	–	1
2.	Plant Breeding & Genetics	–	1
3.	Agrl. Entomology	–	–
4.	Plant Pathology	2	4
5.	Soil Science & Agrl. Chemistry	–	1
6.	Food Science & Nutrition	2	1
7.	Econometrics	1	–

Seminars/Symposia/Conferences

** Scientific Workers' Conference (Horticulture) at TNAU, Coimbatore. September 9, 1993.

** National Seminar on Optimization of production and productivity of acid lime at Hort. College & Res. Inst., Periyakulam. October 3, 1993.

** Second National Symposium on Developments in Plant Molecular Biology and Genetic Engineering at TNAU, Coimbatore. December 29-31, 1993.

** Workshop on Plant Molecular Biology at TNAU, Coimbatore. February 4, 1994.

** Eleventh Regional Research Council for Hilly and Tribal Zone at Horticultural Res. Station, Thadiyankudisai. May 21, 1993.

** Zonal Symposium on balanced fertilizer use at TNAU, Coimbatore. December 2, 1993.

** National Symposium on Integrated Input Management for Efficient Crop Protection at TNAU, Coimbatore. February 22-25, 1993.

** Crop Scientists Meet on Millets and Forages at TNAU, Coimbatore. April 4, 1993.

** Crop Scientists' Meet (Sugarcane) at Sugarcane Research Station, Sirugamani. July 27, 1993.

** Regional Research Council Meeting of High Rainfall Zone at Hort. Research Station, Pechiparai. March 26, 1994.

** Regional Research Council Meeting of the Southern Zone at Regional Res. Station, Arupukkottai. February 5, 1994.

** Regional Res. Council Meeting of the Cauvery Delta Zone at Tamil Nadu Rice Research Institute, Aduthurai. February 9, 1994.

** Regional Research Council Meeting of North Western Zone at Regional Res. Station, Paiyur. January 29, 1994.

** Eighth Biennial Workshop of All India Coordinated Research Project on Tropical Fruits at Horticultural College & Res. Institute, Periyakulam. October 4-7, 1993.

** Scientific Workers' Conference (Sericulture) at TNAU, Coimbatore. July 29, 1993.

** State Level Cashew Seminar at Regional Res. Station, Vridhachalam. October 11, 1993.

** Crop Scientists' Meet on Cotton at TNAU, Coimbatore. June 20, 1993.

** Rice Scientists' Meet at Tamil Nadu Rice Res. Institute, Aduthurai. April 19-20, 1993.

** Regional Res. Council Meeting of Cauvery Delta Region at Tamil Nadu Rice Res. Inst., Aduthurai. May 5, 1993.

Trainings / Farmers' Days

** Mushroom Cultivation Training Programme at National Pulses Research Centre, Vamban. March 5, 1993.

** Farmers' Day at National Pulses Res. Centre, Vamban. February 11, 1994.

** Rabi pre-season Training at Regional Res. Station, Arupukkottai. October 12, 1993.

** Training on Test for Identifying food adulterants at Agricultural College & Res. Inst., Madurai. June 3, 1993.

** Farmers' Day at TNAU, Coimbatore. January 8, 1994.

** Seminar on Cotton Cultivation at Cotton Res. Station, Srivilliputtur. October 7, 1993.

** Training Programme on Mushroom Cultivation for Farm Women at Agricultural Res. Station, Ramanathapuram. May 11, 1993.

** State Level Training Programme on Rice Production Technology at Agricultural College & Res. Institute, Madurai. November 23-25, 1993.

** Farmers' Day at Agricultural College & Res. Institute, Madurai. January 24, 1994.

** State level Training Programme on rice production technology at TRRI, Aduthurai. September 15, 1993.

** Training on mushroom cultivation at TRRI, Aduthurai. September 15, 1993.

** Training Programme on Coffee Cultivation for B.Sc.(Hort.) students at Horticultural Res. Station, Thadiyankudisai.

** Training Programme on Biological Control and Mass Production of Biocontrol Agents at TNAU, Coimbatore. April 16, 1993.

** National Training Programme on Biocontrol of Crop Pests at TNAU, Coimbatore. August 24-31, 1993

** Biofertilizer Field Day at Agricultural College & Res. Inst., Killikulam. October 27, 1993.

** Training on Seed Pathology for Forest Department Personnel at Dept. of Plant Pathology, TNAU, Coimbatore. April 1993

** Training on Management of Rice Diseases to Defence Personnel at TNAU, July 1993.

** Farmers' Day at Regional Res. Station, Paiyur. January 29, 1994.

** Farmers' Day at Rice Research Station, Tirur. December 30, 1993.

** Neem Day at Rice Research Station, Tirur. September 11, 1993.

** Farmers' Day at Agricultural College & Res. Inst., Madurai. January 24, 1994.

** Training on Banana Cultivation at Regional Res. Station, Vridhachalam. April 21, 1993.

** Training on Farm Implements at Regional Res. Station, Vridhachalam. June 22. 1993.

** Farmers' Day at Agricultural Res. Station, Kovilpatti, January 6, 1994.

** Training programme on Mushroom and Vegetable Cultivation for Farm Women at Regional Res. Station, Vridhachalam. July 26 -30, 1993

** Training on Seed Management and Pelleting at TNAU, Coimbatore, September 21, 1993

** Training on Seed Processing at TNAU, Coimbatore, December 9, 1993

** Training on Forest Tree Crops for Forest Rangers at TNAU, Coimbatore. June 7, 1993

** Farmers' Day at Regional Research Station, Arupukkottai. February 5, 1994

** Training on Dry Farming Technology at Regional Research Station, Arupukkottai. June 28, 1993

** Farmers' Day at National Pulses Res. Centre, Vamban. February 11, 1994

** Training on Organic Farming at Soil and Water Management Res. Institute, Thanjavur. February 21, 1994

** Training Programme on Biotechnology of Azolla Biofertilizer at TNAU, Coimbatore. February 15 - March 7, 1993

** Training on Vegetable Cultivation and Vegetable Seed Production at Vegetable Res. Station, Palur. June 11, 1993

** Training on Mulberry Production at TNAU, Coimbatore. September 13, 1993

Important Events / Visitors

- Spices and Biofertilizers Day was celebrated at Agricultural College & Res, Institute, Madurai on June 30, 1993

- Mr.Justice G. C. Bharuka, Patna High Court visited Agricultural College & Res. Institute, Madurai on March 28, 1993

- Thiru C. Chellappan, I.A.S., Member, Tamil Nadu Public Service Commission visited Agricultural College & Res. Inst., Madurai on June 24, 1993

- Thiru Ku. Pa. Krishnan, Hon'ble Minister for Agriculture, Govt. of Tamil Nadu declared open various buildings at Hort. College & Res. Inst., Periakula on October 3, 1993. Dr. K. L. Chadha, Deputy Director General (Hort.), ICAR presided. Thiru R. C. Panda, Secretaty (Agriculture) and Dr. S. Sankaran, Vice - Chancellor, TNAU participated.

- Dr. V. G. Reddy, Cotton Specialist, Nandial, Marathwada Agrl. University visited Cotton Res. Station, Srivilliputtur on May 24, 1993

- Dr. C. R. Bhatia, Secretary, Dept. of Biotechnology, Govt. of India visited TNAU, Coimbatore on December 29, 1993 and delivered the SPIC Sponsored Biotechnology Endowment Lecture. Dr. S. Sankaran, Vice - Chancellor, TNAU presided.

- Dr. M. Velayutham, Assistant Director General (Soils), ICAR, New Delhi visisted the Dept. of Soil Science, TNAU, Coimbatore on April 24, 1993

- Dr. J. D. Beaton, Soil Scientist from Canada visited the Dept. of Soil Science, TNAU, Coimbatore on December 2, 1993

- The First College Day and Hostel Day of Agricultural College and Res. Institute, Tiruchirapalli was celebrated on September 17, 1993

- Dr. N. T. Singh, Director, Central Soil Salinity Res. Inst., Karnal visited the Agrl. College & Res. Instt., Tiruchirapalli on August 23, 1993

- Mrs. Jenny Springer, U. S. Fulbright Scholoar visited Rice Res. Station, Ambasamudram on Augugst 10, 1993

- Charles L. McMurray and Warren O. Johnson, GSE Team Leaders, USA, visited Rice Res. Station, Ambasamudram on January 26, 1994

- Four Member Team of World Bank Consultants visited Agricultural Res. Station, Aliyarnagar on July 28, 1993

- Dr. J. D. Beaton and Dr. M. D. Stanffer, Directors, Potash and Phosphate Institute, Canada and Washington respectively visited Agricultural Res. Station, Aliyarnagar on December 12, 1993

- World Food Day was celebrated at Agrl. College & Res. Instt., Madurai on October 15, 1993

- Dr. Roger Packham, University of Western Study, Hanesburg, Australia visited TNAU, Coimbatore on September 9, 1993

- Dr. J. K. Ladh, Soil Microbiologist, IRRI, Philippines visited TNAU, Coimbatore on September, 26, 1993

- Dr. S. C. Modgal, Vice - Chancellor, G. B. Pand University visited TNAU, Coimbatore on February, 2, 1994

- Dr. B. S. King Kent, U.K. visited Dept. of Entomology, TNAU, Coimbatore on November 24, 1993

- Thiru Ku. pa. Krishnan, Hon'ble Minister for Agriculture visited Hort. College & Res. Inst., Periyakulam on June 4, 1993

- Dr. H. B. Singh, Project Coordinator (All India Coord. Res. Proj.) visited Hort. College & Res. Inst., Periyakulam on August 23, 1994

- Dr. Shoshan Madhavan, University of West Mierster, London Bioenergy Department, visited TNAU, Coimbatore on August 2, 1993

- Dr. Kyeiakos Maniahis, Dept. of Chemical Engg., Belgium visited the Bio-energy Dept., TNAU, Coimbatore on February 7, 1994

- Club Day and Hostel Day were celebrated at Agrl. College & Res. Institute, Killikulam on July 10 ,1993

- Students Club activities were inaugurated at Agrl. College & Res. Institute, Killikulam on August 20, 1993

- Dr. Warren D. Johnson, Soil Conservation Service, USA Visited Agrl. College & Res. Inst., Killikulam on January 28, 1994

- Dr. A. K. Sarbhoy, Past President and Dr. J. P. Varma, President Elect, Indian Phytopathological Society, New Delhi visited TNAU, Coimbatore on January 26, 2994

- Thiru. R. C. Panda, I.A.S., Special Secretary, Agriculture Department, Tamil Nadu visited Horticultural Res. Station, Kodaikanal on April 26, 1993

- Dr. Samuel, M. Jok, Agroforestry Coordinaator, Nigeria visited Horticulture Res. Station, Kodaikanal on february 3, 1994

- Dr. Wheeler, Dr. Linda Handley and Dr. Michael Bulfin, University of Glasgow visited Horticultural Res. Station, Vijayanagaram on January 12, 1994

- Dr. S. Sankaran, Vice - Chancellor, TNAU declared open the New Training Hall, Horticultural Lab. and Engineering Workshop at Regional Res. Station, Paiyur on January 29, 1994

- Dr. Kfellen Wickman, Sweden visited the Dept. of Environment Science on October 13, 1993

- Dr. R. C. Bhatia, Secretary, Dept. of Biotechnology visited the Dept. of Environmental Science on December 29, 1993
- Inauguration of National Symposium on Plant Molecular Biology and Genetic Engineering at TNAU, Coimbatore was held on December 29, 1993
- Dr. Vicky Buchaman and Dr. Charles Ainsworth Nye College, University of London visited TNAU, Coimbatore during January 26 - February 4, 1994
- Dr. S. Sankaran, Vice - Chancellor, TNAU, Coimbatore declared open the new office - cum - lab Complex, T&V Conference Hall, Guest rooms and Screen House at Rice Res. Station, Tirur on December 30, 1993
- Dr. Bill Nickel, Economist, World Bank, Washington visited Water Technology Centre, TNAU, Coimbatore on December 10, 1993
- Dr. Volk, Associate Director, USDA, Oregan, USA Visited Water Technology Centre, TNAU, Coimbatore on May 25, 1993
- Dr. T. C. Jain, World Bank (NARP) Member and Dr. K. N. Singh, Asst. Director General (NARP), ICAR visited Agricultural Res. Station, Kovilpatti on February 24, 1994
- Thiru. Ku. Pa. Krishnan, Hon'ble Minister for Agriculture, Govt. of Tamil Nadu along with Secretary to Government (Agri.) and Director of Agriculture visited Agrl. Res. Station, Pattukottai and SWMRI, Thanjavur on October 31, 1993
- Mr. Anne Elings from Centre for Agro-biological Research, Wageningen, The Netherlands and Miss Elsa Rubia from IRRI visited Soil and Water Management Res. Institute, Thanjavur on November 11, 1993
- Dr. Hein Ten Berge and Dr. Macro Wopercis, SARP Scientists from IRRI, Philippines visited Tamil Nadu Rice Research Institute, Aduthurai on November 28, 1993
- Dr. L. E. Aragon, INSURF Co-ordinator, IRRI, Philippines visited Tamil Nadu Rice Res. Inst., Aduthurai on October 18, 1993
- Thiru K. Lawrence, Hon'ble Minister for Forests, Govt. Of Tamil Nadu visisted Hort. College & Res. Instt., Mettupalayam

FOREIGN VISITS

a. Vice - Chancellor's participation in Workshop / Seminar etc. during 1993-94

Name and Description	Place of visit	Period	Purpose	Sponsoring Agency
Dr. S. Sankaran Vice - Chancellor Tamil Nadu Agricultural University Coimbatore - 3.	1. Philippines	(Sept. 1 - 3) 1993	Second SARP Steering Committee Meeting	IRRI, Philippines
	2. Netherlands	(Nov. 22 - 26) 1993	Workshop on opportunities for use of systems research methods in Agriculture in developing Countries jointly organised by ISNAR and ICASA and presented a paper on use of Systems Analysis methods - Experience at a National Level (India) Visited the Centre of Agro Biological Research at Wageningen, The Netherlands	ISNAR AND ICASA
	3. Sweden	(Nov. 27 - 30) 1993	Visited University of Linkoping, KTH and Agrl. University UPPSALA	The Royal Instt. of Technology, Sweden.

b. List of Scientists participated in Seminar/Conference/Workshop/Training etc during 1993-94.

Name and Description	Place of visit	Period	Purpose	Sponsoring Agency
1. Dr. S. R. Sree Rangasamy, Director, Centre for Plant Molecular Biology, Coimbatore 2. Dr. P. Vidyasekaran, Director, Centre for Plant Protection Studies, Coimbatore 3. Dr. C. Ramaswami, Professor of Agrl. Economics, Department of Agrl. Economics, TNAU, Coimbatore	Chiang Moi Thailand	1.2.1993 to 5.2.1993	Sixth Annual Meeting of the Rockfeller Foundation's International Programme on Rice Bio-Technology	The Rockfeller Foundation
4. Dr. M. Jeyapragasam Professor (CPMB) Coimbatore	Bangkok Thailand	1.2.93 to 5.2.93	Sixth Annual Meeting of the Rockfeller Foundations International Programme on Rice Bio - Technology	Rockfeller Foundation Project
5. C. Surendran, Professor and Head, FC&RI, Mettupalayam	Bangkok, Thailand	18.1.93 to 22.1.93	Inter-Regional Consultation on Neem Improvement	Winrock International

Name and Description	Place of visit	Period	Purpose	Sponsoring Agency
6. K. Rajendran, Asst. Professor (Agron.) Dept. of Agronomy SCMS, Coimbatore.	IRRI Manila Philippines	1.2.93 to 26.3.93	Insurf training course at IRRI	IRRI/INSURF
7. Dr. A. Palaniswamy, Asst. Professor (Agrl. Extn.)	U.K.	Three weeks from 1.2.93	Training under Agrl. Extension Management Project Phase - II (AEMTP) at U.K.	AEMTP
8. Dr. K. A. Ponnusamy, Associate Professor (Agrl. Extn.) Office of the D.E.E. TNAU, Coimbatore				
9. A. Ravikumar Theodore Asst. Professor (Extn.) AC&RI, Killikulam				
10. Th. F. Salal Rajan, Assistant Professor (Pl. Patho.) Dept. of Spices and Plantation crops HC&RI, Coimbatore	AVRDC Taiwan	22.2.93 to 15.3.93	Training course on Advanced Methods for Virus disease diagnosis	AVRDC APO
11. Dr. K. Ramaswamy Professor (Micro) Dept. of Bio-Energy, CAE, Coimbatore	Japan	23.2.93 to 5.3.93	APO - Study meeting of sustainable Agriculture	APO

Name and Description	Place of visit	Period	Purpose	Sponsoring Agency
12. Dr. Syed Moshin Ibrahim, Assoc.Professor (Ag. Bot.), Dept. of Agrl. Botany, AC&RI, Madurai	USA	One year from 1.2.93	Post-Doctoral Fellowship award in Research on Rice Biotechnology Rockfeller Foundation	Rockfeller foundation
13. Th. S-Sukumar, Assistant Professor (Plant Breeding) Centre for Plant Molecular Biology, Coimbatore	Japan	Six months from 2.3.1993	Training Programme on Protoplast Fusion Studies in Indica and Japanica Rice	Rockfeller foundation
14. Dr.S.Sadasivam, Prof. & Head, Dept. of Bio-chemistry, CPMB, Coimbatore	USA	Six months from 1.5.93	Rockfeller foundation visiting scientists Fellowship for Research work in Rice Bio-Technology	- do -
15. Tmt.N.Punitha, Asst. Professor(Ag.Econ.), Dept. of Agrl. Economics, Coimbatore	Germany	26.3.93 to 31.10.96	To persue Ph.D. degree in Agrl. Economics	DRAD Scholarship
16. Th.R.Venkataram Asst. Professor (Agrl.Econ.) Dept. of Agrl. Economics, TNAU, Coimbatore	Germany	29.3.93 to 31.10.95	- do -	- do -

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
17. Dr.K.Palanisami, Prof. of Ag.Eco. WTC, Coimbatore	IRRI Manila, Philippines	13.4.93 to 15.4.93	IRRI-Project Workshop on Projections and Policy Implications of Long Term Rice supply & demand	IRRI, Manila
18. Dr.T.M.Thiyagarajan Professor of SS&AC TRRI, Aduthurai	China	14.4.93 to 17.4.93	SARP-Agro-Eco-Systems workshop	IRRI Manila
19. Dr.S.Jeyaraman Asst. Professor(Agron) TRRI, Aduthurai				
20. Dr.S.Palanisamy, Prof.(Rice) Dept. of Rice, TNAU, Coimbatore				
21. Dr.R.Balagurunathan Assoc.Prof.(Ento) Dept. of Agrl.Entomology CPPS, Coimbatore	Belgium	Three months from 15.4.93	Training Programme in Advanced Ecopathological research Mathodologies at unit of Ecology and Biogenography	Catholic Univ. of Leuven, Belgium

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
22. Dr.SP.Palaniappan Director, SCMS, Coimbatore	AIT, Bangkok. Thailand	19.4.93	To discuss with Dutch Scientists on the possibility of collaboration on Development of Agrl. Model between TNAU and CABO	CABO, Netherlands
23. Th. R. Annamalai, IFS Dean, FCARI Mettupalayam	Chiangmai Thailand	8.6.93 to 12.6.93	FAO-Regional Expert consultation on curriculam Development in Agro-Forestry and community Forestry	FAO, Thailand.
24. Dr.SP.Palaniappan Director, SCMS Coimbatore 25. Dr.S.Kannaiyan Prof. of Ag.Microbiology Dept. of Ag.Microbiology Coimbatore.	China	14.6.93 to 20.6.93	INSURF-Site visit and planning meeting	IRRI, Manila

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
26. Th.R.Narayanan Asst. Professor (Micro) FC&RI, Mettupalayam	U.K. & Brussels	18.6.93 to 9.8.93	To discuss research progress of EEC funded collaborative Research Project	EEC Project Fund
27. Th.M.N.Budhar Asst. Pforessor (Agron) TRRI, Aduthurai	CABO, Netherlands	17.5.93 to 16.7.93	For doing research within the Frame work of his Ph.D. study under SARP Project.	SARP Project, Netherlands.
28. Dr.T.M.Thiyagarajan Prof. of SS&AC TRRI, Aduthurai	CABO Netherlands	1.7.93 to 15.8.93	For doing Research work under SARP Project/Ph.D. study	SARP Project, Netherlands
29. Th.R.Sivasamy Asst. Prof.(SS&AC) SWMRI, Thanjavur		1.7.93 to 30.9.93		
30. Dr.C.Ramaswami, Registrar TNAU, Coimbatore	Japan	31.8.93 to 10.9.93	APO-Seminar on Improvement of Farm Level infrastructure	APO Japan

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
31. Dr.C.Surendran Professor FC&RI, Mettupalayam	Kulalumpur Malaysia	13.9.93 to 18.9.93	To attend 14th Commenwealth Forestry Conference	FRED/WINROCK International Instt., Thailand
32. Dr.S.Mohandass Asst.Professor(Crop.Phy) TRRI, Aduthurai	IRRI Mainla Philippines	27.9.93 to 22.10.93	To work on modelling the impact of climate change in India under the EPA-IRRI Project with IRRI Scientists	IRRI Manila
33. Dr.S.Jayaraman Asst.Professor(Agron) TRRI, Aduthurai				
34. Dr.T.M.Thiyagarajan Prof of SS&AC TRRI,Aduthurai	Suw South Korea	1.11.93 to 10.11.93	To attend SARP workshop on Crop and soil Management with emphasis on Nitrogen Management and Modelling.	SARP-IRRI Project
Th.M.N.Budhar Asst.Prof.(Agron) TRRI,Aduthurai				

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
35. Th.R.Sivasamy Asst.Prof.(SS&AC) SWMRI, Thanjavur 36. Dr.S.Ramaswamy Asst.Professor(Agron) Dept. of Agronomy Coimbatore	Suw South Korea	1.11.93 to 10.11.93	To attend SARP workshop on Crop and soil Management with emphasis on Nitrogen Management and Modelling.	SARP - IRRI Project
37. Dr.M.Balasubramanian Prof. and Head, Dept. of Farm Machinery Coimbatore	Germany	18.9.1993 to 26.9.1993	To attend International Agrl. Trade Fair in Germany	Own cost
Extension of Training				
38. Th.S.Sukumar Asst.Prof.(Pl.Breeding) CPMB, Coimbatore	Japan	Sept.93 to Aug. 94	Training programme on Protoplast Fusion studies in India and Japanica Rice Research	Rockfeller Foundation

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
39. Dr.M.Gopalan Dean, P.G.Studies TNAU, Coimbatore	Vientiane LAOS	18.8.93 to 8.10.93 (period treated as E.L)	To take up the consultancy assignment offered by the FAO	FAO of the United Nations.
40. Thiru R.Narayanan Asst. Professor (Micro.) FC&RI, Mettupalayam	Germany Ireland and Brussels	19.10.1993 to 10.12.1993	To attend planning Meeting, Training visit, and to discuss scheme proposals	EEC funded STD-3 Project
41. Dr.K.Palanisami, Professor of Agrl. Economics, WTC, Coimbatore	Washington USA and Sweden	21.10.1993 to 1.12.1993	For writing final report of the IRPRI collaborative project and to attend workshop at Sweden	IFPRI, USA
42. Dr.N.Kempuchetty, Professor of Agronomy TRRI, Aduthurai	IRRI, Manila, Philippines	23.10.1993 to 15.2.1994	To attend training on Rice Weed Competition Modelling Under SARP Project	IRRI-SARP Project

S. Name of the Scientists	Place and Country deputed abroad	Period	Purpose	Sponsoring Agency
43. Dr.N.M.Ramaswamy, Professor and Head, Department of Plant Molecular Biology and Bio-Technology, Coimbatore	University of Partanian, Malaysia	16.11.1993 to 20.11.1993	To attend International Symposium on Application of Plant invitro Technology	Asian Network for Biological Sciences and organising Committee.
44. Dr.S.Kannaiyan Professor of Biotechnology, Department of Agrl. Microbiology, Coimbatore.	Indonesia	29.11.1993 to 31.12.1993	To attend Azolla Training Course organised by the SURIF, Indonesia	IRRI-Manila INSURF - Project
45. Dr.K.Palanisami, Professor of Agrl. Economics WTC, Coimbatore.	Bangkok Thailand	24.1.1994 to 26.1.1994	To attend the third workshop on the International Collaborative Research Project on Rice supply demand	IRRI-Philippines
46. H.John Ambrose AP.(Ento.) Agrl. Entomology, Coimbatore.	USA	3 years from 1.1.94	Ph.D. higher studies	Rotary Hunger Scholarship.

FINANCE AND ACCOUNTS

The following statement indicates the classified summary of the transactions of the University during 1993-94.

		Amount (Rs. in lakhs) (Unreconciled & unaudited figures)
Details		
Receipts		
Agriculture		
Non Plan	1050-00	
Plan	1184-76	2234.76
ICAR Grant		
ICAR (Fully financed)		
ICAR (Partly financed)	401.17	
Development Grant	56.00	457.17
Government of India Schemes		212.26
Outside Agencies		
Foreign and Indian Agencies		
Research Schemes		58.59
Other Receipts		
Agriculture (Fee, rent, farm receipts etc)		320.24
Loans and Advances including deposits		40.00
Total		3322.96

Expenditure

1.	Agriculture Non-Plan	1325.00
2.	Agriculture Plan	1230.00
3.	ICAR Fully financed schemes - including National Agricultural Research Project and KVK, Pondicherry, ICAR Partly financed scheme	415.65
4.	Government of India Schemes	233.42
5.	Other Agencies	64.46
6.	ICAR Development Grant	61.60
7.	Deposit transaction including Loans and Advances	105.00
		3435.13

The Finance Committee at its meeting considered and recommended the budget estimate of 1993-94 of Tamil Nadu Agrl. University and recommended the estimate to the Board of Management and the same was approved by the Board of Management. The annual audited accounts for the year 1992-93 have since been finalised. As the accounts for 1993-94 are yet to be compiled and sent to audit, the figures furnished for the year 1993-94 will be treated as provisional.

University Budget Estimate for 1994-95

Subject to approval of full annual financial estimates of Tamil Nadu Agricultural University for the year 1994-95 by the Government, the estimates are tentatively fixed as detailed below:

	(Rs. in lakhs)
Net grant by the State Government	Rs. 2311.15
Grants from ICAR including the implementation of ICAR development grants and NARP Schemes	Rs. 488.60
Government of India	Rs. 140.76
Other Agencies	Rs. 74.88
University Receipts	Rs. 331.05
Gross appropriation	Rs. 3346.44

3. EDUCA TION

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE

Dr. S. Kanniayan was the Dean (Agri), Coimbatore. The college offered B. Sc.(Agri) degree programme under the semester system. The particulars of students on roll (boys and girls) in different years of degree programme are furnished below.

Degree Programme	Year	Boys	Girls	Total
B.Sc. (Agri)	I	48	27	75
	II	70	13	83
	III	29	39	68
	IV	112	24	136

Educational Tour

Study tours were conducted for II Year and III Year B.Sc.(Ag) students. The students were taken in two batches to the following research stations.

1. Sugarcane Research Station, Sirugamani
2. Soil Salinity Research Centre, Trichy
3. Tamil Nadu Rice Research Institute, Aduthurai
4. Sugarcane Research Station, Cuddalore
5. Krishi Vigyan Kendra, Pondicherry
6. Agricultural Research Station, Vridhachalam

and

7. Horticultural Research Station, Yercaud

The students were exposed to the different agro-climatic regions and taught about the existing cropping pattern, soil types , common package of practices and socio-economic conditions of the local farming community. A total of 214 students participated in the tour.

All India Study Tour

The final year B.Sc.(Ag) students were taken All India Study Tour during 19.3.94 to 5.4.94 to the following places: ICRISAT, APAU, CPPRI, AICRIP, CRIDA and NAARM at Hyderabad; IFRI and IARI, New Delhi and Haryana Agricultural University, Hissar. One hundred and thirteen students took part in the tour.

Village Stay Programme

The 30 day Village Stay programme for the final year B.Sc.(Ag) students numbering 177 was organised from 14.7.93 to 12.8.93. The students were placed in small groups of 6 - 7 each. All the girls students were placed in Periyar and Salem Districts while the boys in Dharmapuri district. The Joint Directors of concerned districts and Heads of Research Stations / Centres of Bhavanisagar, Paiyur and Namakkal provided necessary assistance for coordination of this programme. The students were placed in the following villages.

Modakurichi, Chettithottamputhur, Kugalur, Kallipatti, Konnamadai, Nambiyur, Senbagaputhur of Periyar District, Seelanaickenpatty, Ammapalayam, Namakkal, Narayanampalayam, Mettur Dam and Rasipuram of Salem District and Dharmapuri, Krishnagiri, Paiyur and Hosur of Dharmapuri District.

During the village stay programme the students were attached to the contact farmers and they met the farmers with the help of local Assistant Agricultural Officers to gather the information. They conducted demonstration of improved practices, small group discussions and meetings involving private firms and government officials. They broadcast the information about the meeting through All India Radio, pamphlets, Charts and other models were prepared and displayed during their demonstration activities.

Scholarships

Many Scholarships were available to the students. Following is the list of such scholarships

Sl.No.	Name of the Scholarship	No. of recipients	Total amount
1.	ICAR Junior Fellowship	78	14,28,930
2.	ICAR Senior Fellowship	11	
3.	ASPEE Junior Fellowship	12	87,190
4.	ASPEE Senior Fellowship	2	
5.	CSIR Fellowship	13	3,50,502
6.	ITEC Vietnamese - Senior Fellowship	1	26,863
7.	ICCR Junior Fellowship (Fiji)	1	29,760
8.	ICCR Junior Fellowship (Cambodian)	1	31,193
9.	Indo - ARE Scholarship - Senior	1	18,000
10.	T. Stanes & Co. Senior Fellowship	1	48,400
11.	Madras Fertilizers Ltd., Junior Fellowship	1	17,760
12.	Ghardha Chemicals Ltd., Junior Fellowship	1	40,800
13.	Bagyanagar Labs. Junior Fellowship	1	24,640
14.	National Organic Chemicals India Ltd	1	25,600
15.	Pondicherry Co.op. Sugar Mills Ltd.	1	7,000
16.	Tamil Nadu State Council for Science & Technology	1	9,000
17.	AC&RI Merit Scholarship M.Sc.(Agri)	1	9,012
	B.Sc.(Agri)	1	
18.	Government of Pondicherry Post Matric Scholarship	3	2,700
19.	Adhoc Merit Grant for UG	7	2,700
20.	Andaman & Nicobar Scholarship (UG)	9	22,495
21.	Bright Students Award - UG	3	2,880
22.	Gandhi Memorial Grant for UG	1	1000
23.	National Merit Scholarship	19	51,780
24.	SC Scholarship	29	87,919
25.	SC Loan Scholarship	45	67,500
26.	BC Scholarship	48	63,034

Students' Hostel

The students including boys and girls were accommodated in various hostels. Seven messes were functioning efficiently and economically on the basis of dividing system. The mess representatives nominated by the warden in consultation with the students managed the messes successfully. Most of the academic requirements viz., record note, herbarium sheets, etc, besides eatables and cosmetics for the students were supplied by the Student's Canteen. The University Medical Officer took care of the medical facilities of the inmates of the hostel. The Lady Medical Officer was attending to the medical needs of the girl students in Ladies Hostel by visiting the hostel daily between 4.00 and 5.00 pm.

Students' Club

Main campus cultural and orchestra teams participated in the All India Inter - Varsity National Cultural Exchange Programme which was organised by Madras Varsity and conducted by Sathyabama College of Engineering, Mamallapuram from 25.7.93 to 31.7.93. Six men and nine women students participated in this "UNIFEST 93" and received mementos and certificates.

Our students participated in "TALENTIA'93" held at Agricultural College and Research Institute, Madurai on 5th and 6th August, 1993. Thiru Jayant Kishore, II B.E. (Ag) won first place in English Story Writing. Thiru A. Manickavasagam, III B.E. (Ag) won second place in Tamil Extemphore. Thiru Dheenadayalan, B.Sc.(Ag) won second prize in Tamil Essay writing. Orchestra team participated in the COTERIE ' 93 CCIT's cultural festival held on 14.8.93 at Rajasthani Sangh and won first prize in Orchestra. Thiru S. Mahesh Babu, won second place in Instrumental Music.

Social Service League Society celebrated Independence Day on 15.8.93 in a grand manner. Dr. S. Sankaran, Vice - Chancellor hoisted the National Flag. Dr. M. Gopalan, Dean (P.G. Studies) distributed the prizes to the winners of various competitions. Social Service League students celebrated Fourth Annual Day at Telungupalayam Night School on 27.9.1993. Dr. I. Irulappan, Dean (Horticulture) inaugurated the function. Prizes were distributed to the winners of various competitions. Free uniform dresses were also distributed to the poor school children. Main campus men and women students participated in the South Zone Inter University Cultural Festival organised and conducted by Mahatma Gandhi University, Kottayam from 6th to 8th February, 1994.

Sports and Games

Tamil Nadu Agricultural University Sports Council Meeting was held on 9.7.93 at Tamil Nadu Agricultural University, Coimbatore. Dr. S. Sankaran, Vice-Chancellor and Chairman, presided over the meeting. Inter-Collegiate Tournaments of Tamil Nadu Agricultural University Campuses were conducted in football, Hockey, Kabaddi, Ball badminton, Cricket, Volley ball, Kho kho, Table Tennis and Chess for women in different campuses of Tamil Nadu Agricultural University during 1993-94. The students participated in the Inter University Tournament in Hockey, Football which were hosted by Madras University and Kerala Agricultural University, Mannuthi respectively. They also participated in the Tamil Nadu Inter Engineering Sports 1994 held during February 94 at Regional Engineering College, Trichi. The Campus Cricket Team took part in the Coimbatore Inter Collegiate Tournament and SNR College Cricket Tournament. The Hockey Team participated in the CIT Trophy Hockey Tournament, the Chess Team in the Mangalam Annual Memorial Chess Tournament and the Table Tennis Team in the PSG Trophy Tournament during 1993-94. Swimming Coaching Camp for the Children was conducted during May 1993. More than 35 Children attended the Camp.

National Cadet Corps

During the period under report, 15 parades of 4 hours duration were organised for the NCC cadets covering the subjects on NCC Motto and ideals, weapon training, drill, map reading, civil defence, first aid etc. Cadet under officer Th.S.Palanisamy of Third Year B.Sc.(Agri) student attended Army Attachment Training Camp from November 1-15, 1993 held at the Madras Regimental Centre, Wellington. He also attended Annual Training Camp held at Kovaipudur from June 14-25, 1993. The NCC Cadets also took antidowry pledge and organised adult education programme, tree planting etc. In coordination with Rotary Club, blood donation camp was also organised in November 1993.

National Service Scheme

National Service Scheme of Tamil Nadu Agricultural University has an allocated students strength of 800 for the year 1993-94. This strength is spread all over the constituent colleges of TNAU. Under Regular activities, the NSS student volunteers carried out tree planting, blood donation, road relaying, campus beautification services during university and college functions, awareness campaign on communal harmony, National Integration, adult literacy, AIDS, 50th year of Quit India Movement, National Youth Week and allied activities. The students collected relief funds for the Maharashtra earthquake victims.

Under Special camping activities, totally six special camps were conducted at different campuses of TNAU. During the ten days camps, the student volunteers participated in transfer of technology programmes, medical, veterinary and plant protection campaign, soil testing, training on mushroom cultivation, adult education, parthenium eradication, kitchen gardening, white washing school buildings and cultural programmes. A trekking programme was conducted to Top Slip under the Aventure Promotion Programme which was financially sponsored by the Department of Youth Affairs and Sports, Government of India, New Delhi. Fifty NSS students and three Programme Officers from all the colleges of TNAU participated in the programme.

COLLEGE OF AGRICUTURAL ENGINEERING, KUMULUR

Dr. D.Chandrasekaran was the Dean during the period under report. The college offered B.E.(Ag.) degree programme.

Admission:

Twenty two students were admitted to I B.E.(Ag) course. The number of students on roll in I and II year B.E.(Ag) was as follows.

Class	Boys	Girls	Total
I BE (Ag)	17	5	22
II BE (Ag)	52	10	62
	69	15	84

Scholarships:

Details of scholarships awarded during 1993-94 are given below:

S.No.	Name of scholarship	No. of students	Amount awarded
1)	S.C. Scholarship	8	24,928
2)	B.C. Scholarship	15	16,649
3)	S.C. Loan scholarship	9	15,300
4)	National Merit scholarship	1	1,800
5)	Pondicherry State scholarship	2	1,600

Students' Hostel:

The Dean, College of Agricultural Engineering, Kumulur is of the overall charge of the Hostel. He is assisted by a Warden, Deputy Warden and a security assistant in the day-to-day running of the Hostel. The boy students numbering 69 are at present accommodated in semi-permanent buildings. Girl students numbering 15 are accommodated in four quarters on a temporary basis.

The students select two mess representatives and they run the mess under the direct supervision of the warden and Deputy warden, on the basis of dividing system. There is a students' welfare committee headed by the Dean as the Chairman. The Warden, Deputy Warden, one Professor, Staff Advisor, Administrative Officer and student representatives act as members of the committee. The Committee meets once in two months to review the mess rates and the amenities in the hostel.

Students' club:

The Dean of the College is the President of the students' club. Prof. R.Manian was the Vice-president of the students' club. The Assistant professor of physical education is the Secretary of the students' club. The nominated students' representatives are the office bearer of the various societies and games of the club.

Sports and Games

The first Annual Sports Day was celebrated on 18.8.93. Professor R.Manian, Staff Advisor welcomed the gathering. Dr. V.V.Sreenarayanan, Professor and Head, presided over the meeting. Thiru R. Jageshkumar, Games Secretary, presented the annual report of games and sports. Thiru S.G.Arasangovan, Managing Director, DCTC, Tiruchirappalli acted as the Chief guest and distributed the prizes.

FOREST COLLEGE AND RESEARCH INSTITUTE, METTUPALAYAM

Thiru R.Annamalai was the Dean of the College. The College offers B.Sc.(Forestry), M.Sc.(Forestry), and Ph.D. (Forestry) degree programmes and the number of students on roll is indicated below:

Class		Boys	Girls	Total
II BSc	(Forestry)	13	1	14
III BSc	(Forestry)	16	-	16
IV BSc	(Forestry)	23	1	24
II MSc	(Forestry)	5	-	5
II PhD	(Forestry)	5	1	6
III PhD	(Forestry)	3	-	3

Educational Tour

Final B.Sc.(Forestry) students were on an All India Tour. They visited places of education interest at Bangalore, Dharwad, Panaji, New Delhi, Dehradun, Solan and Bharatpur.

Students of final B.Sc.(Forestry) were on an educational Tour. They visited agroforestry systems and forest types at Erode, Salem, Yercaud, afforestation programme at Neyveli, Mangrove forests at Pitchavaram, bird sanctuary at Vedaranyam, Silvicultural systems at Arimalam, Vamban and interface forestry at Ayyalur and Kodaikanal.

The forests in the Nilgiris Eastern slope about seven kilometers from the institute are frequently visited by students as part of their practical schedules. They also visit the shola forests and grass lands at Nilgiris. A bus exclusively for the forestry students is being fully exploited for trips to these places. The field activities provided by the State Forest Department in their Plantation Corporation, natural forests in Kodaikanal, Top Slip, Shervoroys and Mangrove vegetations in the coast have immensely helped the students in gaining practical insights and visual skills.

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, MADURAI

Dr. S.Purushothaman was the Dean during the period under report. There are 14 departments, ten under the faculty of Agriculture and four under Faculty of Basic Sciences and Humanities. The college offered BSc (Ag) and BSc (HSc) degree programmes besides postgraduate programmes leading to MSc and Ph.D. degrees in different disciplines in Agriculture and Food science and Nutrition.

Admission:

The number of students on roll was as follows:

Class	Boys	Girls	Total
I BSc (Ag)	33	64	97
II BSc (Ag)	52	46	98
III BSc (Ag)	72	26	98
IV BSc (Ag)	69	52	121
I BSc (HSc)	1	16	17
II BSc (HSc)	–	17	17
III BSc (HSc)	1	17	18
I MSc	29	41	70
II MSc	52	28	80
I PhD	21	7	28
II PhD	19	5	24
III PhD	36	8	44

Scholarships

The details of scholarships awarded during the year 1993-94 are furnished below:

Sl.No.	Name of Scholarship	UG	PG	Total
1.	B.C.Scholarship	97	8	105
2.	DNT Scholarship	–	6	6
3.	Adidravidar Welfare Scholarship	29	11	40
4.	Adidravidar Welfare Loan Scholarship	30	10	40
5.	Adhoc Merit Grant	35	–	35
6.	Bright Students Award	3	–	3
7.	Peraringar Anna Memorial Award	1	–	1
8.	National Merit Scholarship	12	–	12
9.	AMM Arunachalam Shastiashthapoorthy Scholarship	1	–	1
10.	Andaman and Nicobar Island Scholarship	6	1	7
11.	Stipend to AAC's	5	–	5
12.	Ex-servicemen welfare scholarship	1	–	1
13.	ICAR Junior Fellowship	–	30	30
14.	CSIR Fellowship	–	6	6
15.	Aspee Agrl. Res. & Development Fellowship	–	3	3
16.	Agri merit Scholarship	32	–	32
17.	TNAU Merit Scholarship	–	6	6
18.	Res. Assistantship	–	3	3
19.	Prize money	–	3	3
20.	Madurai Masone Trust Scholarship	2	–	2
21.	State scholarship for the children of selected Govt. Servants	1	–	1
22.	Govt. of Andhra Pradesh Scholarship (Backward Classes)	1	–	1

Educational Tour

B.Sc.(Ag) second year students were taken on education tour to Regional Research Station, Kovilpatti; Agricultural College and Research Institute, Killikulam; Rice Research Station, Ambasamudram; Cotton Research Station, Srivilliputhur and Horticultural Research Station, Periyakulam in two batches.

Third year students were taken on an educational tour to Vedasandur, Mettupalayam, Bhavanisagar, Sirumugai, Trichy, Thanjavur, Aduthurai, Veppankulam, Vamban and Tamil Nadu Agricultural University, Coimbatore and also Sugarcane Breeding Institute, Coimbatore.

Village Stay Programme

The programme was organised for a period of 30 days. During their stray, the students organised and conducted method demonstrations on latest aspects of farm technologies. They also organised village meetings and mini exhibitions.

Students' Hostel

There were five hostels functioning in this campus to accommodate the students. The hostel was administered by the Dean. He was assisted by a warden, four deputy wardens and one resident tutor besides administrative personnel.

Students' Club

The students' club activities were inaugurated on 4.2.94. Dr. D.Purushothaman, Dean delivered the inaugural address. The students participated in a number of literary and cultural events and competitions and proved their talents in arts, photography, orational elegance, light music etc.

Sports and Games

Twenty eighth Annual Sports meet was conducted on September 20, 1993. Dr.G.Soundrapandian, Dean distributed the prizes. College Cricket, tennis, football and volley ball teams participated in a number of tournaments and friendly matches. Inter-class matches in various games were conducted for boys and girls.

National Cadet Corps

Cadets belonging to different undergraduate classes were enrolled during their period. Training in foot drill, weapon handling, field craft, map reading and first aid was imparted to the cadets.

National Service Scheme

NSS volunteers activity participated in save tree campaign, adult education, tree planting and campus cleaning programmes.

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, KILLIKULAM

Dr. S.Rajasekaran was the Dean during the period under report. There are 10 departments functioning in this college. The college offered B.Sc.(Ag) and M.Sc.(Ag) and part time Ph.D. degree programmes.

Admission

The number of students on roll was as follows:

Class	Boys	Girls	Total
I B.Sc (Ag)	52	27	79
II B.Sc (Ag)	39	69	108
III B.Sc (Ag)	39	46	85
IV B.Sc (Ag)	43	80	123
I M.Sc (Ag)	13	7	20
II M.Sc (Ag)	17	6	23
Ph.D Part time	11	4	15

Educational Tour

Final B.Sc (Ag) students undertook educational tour by visiting ICRISAT at Patancheru, the Forest Research Institute Dehradun, NAARM at Hyderabad, Agricultural Universities at Hissar and Hyderabad, IARI and ICAR at New Delhi. They studied the different agricultural systems which are in operation in various agro-climatic, socio-economic and cultural conditions.

Third B.Sc.(Ag) students visited Tobacco Research Station, Vedasanthur, TNAU Main Campus at Coimbatore, Agricultural Research Stations at Bhavanisagar, Paiyur, Cuddalore, Vridhachalam, Trichy, Pudukkottai and Vamban, Govt. Botanical Garden, Ootacamund and Forest Research Station, Mettupalayam during their study tour.

Second B.Sc (Ag) students visited Agricultural Research Station, Kovilpatti; Regional Research Station, Aruppukkottai, Agricultural College and Research Institute, Madurai; Horticultural College, Periyakulam; Brayants Park, Kodaikanal; Rice Research Station, Ambasamudram; Agricultural Research Station, Thirupathisaram; Regional Research Station, Pechiparai and Government Orchard, Kanyakumari.

Village Stay Programme

Sixty seven final B.Sc(Ag) students stayed for one month with identified progressive farmers in southern districts of Tamil Nadu. During this programme, students learnt local cultivation practices and farmers' problems in agriculture. They were also in touch with extension functionaries of Agriculture Department. They organised method demonstrations, exhibitions and village meetings on latest technologies suited to the area

Scholarships

S.No	Name of the Scholarship/Award	No. of students
1.	Backward Class Scholarship	65
2.	Scheduled Class Scholarship	60
3.	TNAU Merit Scholarship	6
4.	Physically handicapped Scholarship	1
5.	S.C. Loan Scholarship	49
6.	Ex-servicemen Scholarship	2
7.	Bright Student Award	1
8.	Rashtriya Chemicals Fellowship	2
9.	Gandhi Memorial Award	1
10.	Pondicherry Post Matric Scholarship	5
11.	National Merit Scholarship	4
12.	ICAR Junior Research Fellowship	8
13.	Release of Stipend (post metric)	5
14.	ICAR post Matric Scholarship	8
15.	Adhoc Merit Grant	1

Students' Hostel

There are five hostels in this campus to accommodate the students. During the period under report there were 193 boys and 197 girls in the hostel The hostel was run under the charimanship of Chief Warden, assisted by Warden and 2 Deputy Wardens, 2 Assistant Wardens and 3 Residential Tutors. The messes were run on dividing system basis involving student representatives with committees to monitor the purchase of materials, preparation of menu etc.

A full time Medical Officer and one part time Lady Medical Officer attended on the students and provided them the needed medical care

National Service Scheme

The NSS Unit of Killikulam Campus was selected as the best unit in TNAU and awarded the rolling shield and appreciation certificate instituted by the Department of Sports and Youth Services, Govt. of Tamil Nadu NSS volunteers assisted in institutional development work like maintenance of lawns, roads and cleaning the surroundings of class room. They actively participated in adult education, Arivoli Iyakkam, mass tree planting, avenue planting etc.

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, TIRUCHIRAPALLI

The Agricultural College and Research Institute, Navalur Kuttapattu, Trichy started functioning from 7.10.92. The college offered Bsc(Ag) degree programme

The number of students on roll during the year was as follows:

Admission

Class	Boys	Girls	Total
I BSc(Ag)	33	–	33
II BSc(Ag)	34	–	34

Scholarships

Following are the detials of scholarships availed by the students.

Scholarship	No. of students
B.C. Scholarship (I graduation)	7
B.C. Scholarship	1
MBC Scholarship (I graduation)	3
MBC Scholarship	4
DNC Scholarship	1
Adi - Dravidar - Tribal Welfare Scholarship	6

Students Hostel

The students are accomodated in the existing KVK training hostel. Adequate facilities have been provided to the students for their comfortable stay. Mess runs on dividing system. A part-time medical officer attends on the students and provides them required medical care.

Students Club

The formal extra curricular committee was constituted on 10.9.93 with Dean as the president. Four students from this college were deputed to participate in the 'Talentia '93' cultural function held at Agricultural College and Research Institute, Madurai on 5.8.1993. Thiru M. Senthil Kumar of I BSc(Ag) secured III prize in the instrumental music competition.

Sports and Games

Combined function of the first College day, Club day and Hostel day of the Agricultural College and Research Institute, Tiruchirapalli was held on 17.9.93.

Annual Sports Day was also celebrated on the same day with due pomp and show Er. C. N. Balasubramanian, Director, Irrigation Management Training Institute, Thuvakudi, Tiruchirapalli was the Chief guest of the function. Dean presided over the function and presented the Annual Report of the College. Mrs. Balasubramanian distributed the medals and prizes to the winners in sports and games. College kabaddi Team participated in Inter College tournament on 14th December 1993 and emerged as runners.

National Service Scheme

NSS volunteers were involved in planting and maintaining the avenue trees around Agricultural College and Research Institute campus and hostel area. Farm roads affected by heavy rains during monsoon season were repaired by volunteers. Volley Ball and badminton courts were laid out by volunteers in the college campus. The service of NSS volunteers were utilised for the functions organised during the visits of VIP's and in conducting Farmer's Training Programmes.

HORTICULTURAL COLLEGE AND RESEARCH INSTITUTE, PERIYAKULAM

Dr. S. Sambanthamurthy was the Dean during the period under report. The college offered BSc(Hort) degree programme under semester system.

Admission

The number of students on roll is as follows

Class	Boys	Girls	Total
II BSc (Hort)	33	19	52
III BSc (Hort)	25	21	46
IV BSc (Hort)	40	22	62

Educational tour

Students of II B.Sc (Hort) were taken on a tour to Kodaikanal to study ornamental gardening. They learnt various aspects of ornamental gardening and involved themselves in the arrangements of annual flower show in Kodaikanal. Third year students were on Coffee Training Camp for 15 days. The boys were placed at Horticultural Research Station, Yercaud and girls at Horticultural Research Station, Thadiyankudisai. Starting from jungle cleaning the students practically did all operations related to coffee cultivation.

S.No.	Name of the Scholarship	No. of students
1.	TNAU Merit Scholarship	10
2.	Post Matric Scholarship BC	21
3.	Post Matric Scholarship MBC	10
4.	Post Matric Scholarship DNC/DNT	9
5.	Post Matric Scholarship SC/ST	14
6.	Post Matric Scholarship - National Merit Scholarship	5

Students' Hostel

At present students are accomodated in the hostels within the College Campus. The girl students are accomodated in the staff residential complex and the boys are accommodated in the new hostel as well as in the NARP Phase II trainees hostel. The hostels were run by the Dean who was assisted by two deputy wardens and one assistant warden. A part time medical officer was attending to medical needs of the students.

Students Club

The students participated in a number of literary and cultural events and competitions and proved their talents in arts, photography, orational elegance, light music and essay competitions etc. The college sports teams participated in number of tournaments and friendly matches.

National Service Scheme

NSS Volunteers participated in the tree planting, kitchen gardening, adult education programme, etc. The services of the NSS volunteers were utilised for the functions organised during the visits of VIP's and in conducting Farmers' Training Programmes.

POST - GRADUATE EDUCATION

Dr. N. M. Ramaswamy assumed charge and continuing as Dean (PGS) from 17.1.94. Master and PhD degree programmes were offered in 26 disciplines in Agriculture, Horticulture, Agrl. Engineering, Forestry and Food Science and Nutrition in addition to PG diploma in Sericulture.

Admission

During the academic year 1993-94, 265 students were admitted for Master degree programmes and 52 students for Ph.D programmes in Agriculture, Horticulture, Agrl. Engineering, Forestry and Food Science and Nutrition in different campuses of PG education.

Details regarding the number of students admitted and passed out from various PG programmes of the University during 1993-94 are furnished below.

a) M.Sc. (Ag) / M.E. (Ag). Course strength for the year 1993 - 94

S. No.	Subject	Coimbatore	Madurai	Killikulam	Total	No. of students passed out
1.	Agrl. Economics	6	2	-	8	5
2.	Agrl. Entomology	8	4	6	18	11
3.	Agrl. Extension	10	11	4	25	15
4.	Agrl. Marketing Management	2	-	-	2	7
5.	Agrl Microbiology	10	5	-	15	13
6.	Agronomy	13	10	4	27	16
7.	Bio-Technology	18	-	-	18	5
8.	Master of Buisness Management	8	-	-	8	9
9.	Environmental Sciences	5	-	-	5	4
10.	Plant Breeding and Genetics	12	10	5	27	16
11.	Plant Nematology	3	-	-	3	2
12.	Plant pathology	12	5	-	17	2
13.	Seed Technology	18	-	-	18	22
14.	Soil Science and Agrl. Chemistry	10	4	4	18	17
15.	Sugarcane Production	7	-	-	7	6
16.	Water Management	-	-	-	-	6
17.	Horticulture	25	-	-	25	20
18.	Sericulture	8	-	-	8	6
19.	Forestry	4	-	-	4	5
20.	Crop Physiology	3	-	-	3	-
21.	Plant Protection	3	-	-	3	-
22.	Agrl. Processing (M.E. (Ag))	8	-	-	8	4
23.	Soil and Water Conservation	5	-	-	5	3
24.	Farm Power and Machinary	4	-	-	4	-
25.	Bio Energy	2	-	-	2	2
26.	Food Science	-	7	-	7	-

b) **Ph.D degree Programme**

S.No.	Subject	Coimbatore PT	Coimbatore FT	Madurai PT	Madurai FT	Total	No. of students Passed out
1.	Agronomy	–	4	–	1	5	12
2.	Plant Breeding & Genetics	–	6	–	3	9	3
3.	Agrl. Entomology	–	2	–	1	3	3
4.	Plant Pathology	–	5	–	4	9	1
5.	Soil Sci. & Agrl. Chemistry	–	3	2	2	7	3
6.	Agrl. Economics	–	2	–	–	2	1
7.	Agrl. Extension	–	4	–	–	4	3
8.	Seed Technology	–	2	–	–	2	2
9.	Agrl. Microbiology	–	3	–	–	3	–
10.	Crop Physiology	–	–	–	–	–	2
11.	Bio-Technolgy	–	–	–	–	–	–
12.	Plant Pathology	–	–	–	–	–	–
13.	Forestry	–	2	–	–	2	–
14.	Horticulture	–	2	–	–	2	3
15.	Soil & Water Conservation	–	–	–	–	–	–
16.	Farm Power & Machinary	–	2	–	–	2	–
17.	Bio - Energy	–	–	–	–	–	–
18.	Envi. Sciences	1	2	–	–	3	–
19.	Agrl. Processing	–	1	–	–	1	–

Scholarships and Fellowships

	Junior	Senior
ICAR	24	16
Ford Foundation	5	–
TNADP (Extension)	1	–
GOI	2	–
Charda Chemicals Ltd	1	–
INSURF	1	–
Winrock International	1	–
Skans Fetty Biotech, CBE	2	–
State Council Sci. TEch.	2	–
Rasi Seeds (600/pm)	3	–
Dharaji Morarji chemicals	1	–
Tamil Nadu News Print	1	–
TNAU Merit	42	–
ASPEE	1	–
CSIR	–	16
ICAR	3	1

UNIVERSITY LIBRARY

The Tamil Nadu Agrl. University is a learning resource centre for the students, post graduate and Doctoral scholars, Teachers and Scientists of Tamil Nadu Agrl. University, its constituent Colleges, Regional Agricultural and Horticultural Research Stations of Tamil Nadu. It has been profusely used by Post Graduates and Teachers of Bharathiar University, Colleges and Research Institutes in and around Coimbatore City. Apart from these users, the Tamil Nadu Agrl. University Library also cater the information needs of Scientist belonging to the Sugarcane Breeding Institute, Central Institute for Cotton Research, Botanical Survey of India, Institute for Tree Breeding and Genetics and to the Post Graduate of Annamalai University, Madurai Kamaraj University, Kerala Agricultural University, Calicut University, Bharathidasan University,

Colleges of Nilgiris, Periyar and Tiruchi Districts. The Library was kept open for 337 days with 3680 hours for used during the year 1993-94.

During the year 1993-94, 9 new titles of periodicals have been added to the list of 715 titles of current periodicals. About 295 renewal orders have been made to subscribe 570 periodicals (both Foreign and Indian origin). Totally 4916 issues of current periodicals have been in receipt against the orders made and displayed for use. Four thousand nine hunderd and eighty issues of periodicals, reports, bulletins and newsletters were received as gratis and displayed in the respective areas for use. Totally a sum of Rs. 25.52 lakhs had been spent for the subscription of current periodicals during the year under report.

Under the ICAR Development Grants, an amount of Rs.3.00 lakhs have been allotted for the purchase of new books in various disciplines of Research, Education and Extension intended for the main campus. The total amount alloted have been utilised for the purchase of books.

Six hundred and seventy one titles of new books were suggested for purchase by various Heads of Departments. After scrutiny 331 titles were ordered. A total of 325 books was purchased in the regular budget provision for books. Totally 2487 (Theses 169, Review serials 60, Books by gratis 237, back volumes of periodicals 1696, Books 325) volumes of books, back volumes of periodicals and these were included in the stock of the Library during the period under report.

Under the technical processing, about 1133 books have been classified according to the colon classification system to organise and shelving for use. Four hundred and seventy seven subject entry cards, 515 author entry cards and 2173 Shelf Registrar cards were prepared and inserted in the catalogue cabinet in the appropriate area for use. A total of 1431 book cards, tracing cards and date labels have been prepared for the preparation of newly purchased books for use.

The Gate Register have 1,59,212 entries of visitors to the Library. During the year 7,26,436 documents have been utilised by the users. Altogether 60,889 documents were issued on loan for home reading, 54,153 documents were received back after use. Thousand three hundred and fifty new membership cards were distributed. During the year 11896 users belonging to other institutions of Tamil Nadu and elsewhere given permission to use the Library.

The traditional service of reference and literature search assistance have been made to locate the reading materials to those who requested for the same. Under the programme of course work, 2 Under-graduate classes were conducted as an orientation class for Library use. A class for a period of 2 hours has been taken under the Library User Education Programme to the Post-graduates in the departments of Agronomy, Plant Pathology, Entomology etc.

Under the programme of maintenance 320 back volumes of periodicals were prepared and kept ready for binding. A total of 1696 newly bound volumes were checked after binding. One thousand and six hundred and ninety six bound volumes have been brought into stock, prepared for use and shelved in the respective racks of back volumes section for use.

The Library Committee met two times during the year and made useful suggestions for the human resources development, collection development and improvements in the facilities of the library for the users. The budget alloted to the library has been fully utilised.

UNDER GRADUATE LIBRARY

The Under graduate Library is kept open for use from 4.00 p.m. to 8.00 p.m. on all working days for the use of under graduates. During the period under report 7,135 students visited the library. About 1,29,532 books were used in the Library premises and 5366 books were issued on loan for home reading. Three thousand nine hundred and twenty nine books were received back after use.

4. RESEARCH

The major research achievements of the University in the areas of crop improvement, horticulture, agricultural engineering, water technology and agricultural and rural development studies are presented in this chapter.

AGRICULTURE

RICE

Crop Improvement

Varieties Released

MGR Hybrid Rice (Co RH.1) : This rice hybrid (IR 628294/IR 10198 - 66 - 2R) was released during January 1994. It matures in 110 - 115 days and gives a grain yield of 6.36/ha as compared to 5.0 t/ha for IR 50. This is suitable for May - June sowings in Coimbatore, Periyar, Madurai, Chengleput - MGR, North Arcot - Ambedkar, Salem, Thanjavur and Nagapattinam - Quid-e-Millet districts.

ADT 42 : This variety was released during 1994 for general cultivation during Sornavar / Kar/ Kuruvai seasons in Tamil Nadu. This is a cross derivative of AD 9246/ADT 39. In a crop duration of 110 - 115 days, it yields 6.3 t/ha and is superior in grain yield than IR 50, TKM 9, ADT 36 and ADT 37. It has long slender grains and is moderately resistant to BPH and blast.

PMK 2 : A derivative of the cross between IR - 13564-149-3 and ASD 4 maturing in 110 - 115 days was released as PMK 2 for general cultivation during 1994. It gives a yield of 3174 kg/ha under rainfed conditions which is 11.7% higher than PMK 1. Besides drought tolerance this variety is found to be non-lodging. The grain type is medium bold with white rice. This variety possesses resistance to BPH, tolerance to mealy bug and RTV and field tolerance to blast. In view of higher returns compared to PMK 1 and TMK 9 under drought situations this variety is recommended for Ramanathapuram and Pasumpon Muthuramalinga Thevar districts.

Promising cultures

AD 85361 : It is a cross derivative of IR 56 / IR 50. In a crop duration of 105 days, it yields and average of 6.1 t/ha and is superior to ruling short duration varieties. It is moderately resistant sheaths rot, blast and GLH.

TNAU 851979 : This culture matures in 115 - 120 days with a yield potential of 6.0 t/ha. This has medium slender grain with moderate resistance to GLH and BPH. It is being tested under ART in 80 locations.

AS 89030 (AS 17 / AS 16): This is a semi-dwarf culture with a mean yield of 7030 kg/ha in 105 days duration. This is being tested in ART in Kanyakumari District under Semi - Dry conditions.

BR 4290 - 3 - 3 - 5 : This culture has been identified for on- farm testing under Samba - rainfed conditions. It gives an average yield of 2.5 t/ha which is 34.2% higher than PMK 1.

IR 4595 - 54 - 1 - 13 : It is suitable for cultivation under cold conditions prevailing in Dharmapuri Districts. The culture recorded a mean grain yield of 6171 kg/ha as against 5486 kg/h and 5900 kg/ha recorded by MDU2 and MDU4 respectively. The culture is being tested under ART.

AS 90033 : It is a high yielding short duration drought resistance rice variety suitable for sandy tracts of Ramanathapuram district. On an average the culture recorded a mean yield of 2708 kg/ha which was 47.9% higher than the Check Norwegan.

ACM 10 : It is a semidwarf culture developed by selection from the IRCTN 09546 (IR 10476 - 28 - 2 - 2) entry. This culture matures in 100 days with medium slender white grains. It has naturally spread in the semi - dry areas through Minikit trials of Pasumpon Muthuramalinga Thevar, Madurai, Dindigul Anna and Chengai MGR districts under semi-dry condition. It has recorded a yield potential of 5.5 t/ha which is 21.5 % increase over IR 50.

ACM 37: It is a high yielding (4.5 t/ha) semi - dry rice culture which has recorded 21.0 % increased yield over PMK 1. It matures in 120 - 125 days. It was evaluated in ART during 93 - 94 for the 3rd year. It has resistance to blast, sheath rot and stemborer.

ACM 75 : It is a short duration semi-dry culture and has been evaluated under ART in five districts viz., Ramanathapuram, Kamarajar, Pasumpon, V.O.C. and Chengai - MGR districts during 1993-94. It matures in 115 days with a yield potential of 4.5 t/ha. It has tolerance to blast, sheath rot under field conditions.

TNAU 831293 : It is a BPH resistant culture, maturing in 120 days was tested in 25 locations during Kuruvai season of 1993 - 94 under ART in Periyar district. This

culture has given mean grain yield of 6754 kg/ha which is 19% higher than IR 64 (5687 kg/ha).

CROP MANAGEMENT

Experiments were conducted at Madurai to find out the optimum seed rate for wet seeded lowland rice. Graded seed rates viz., 40,60, 80 and 100 kg/ha were tested in the study, using IR 20 as test variety. The results revealed that 80 kg/ha seed rate is optimum to maintain optimum population in order to get higher grain yield (4.5 t/ha) in wet seeded lowland rice.

In wet seeded rice, weed control is a problem both with hand weeding and usage of herbicides. Selectivity was found low with anilofos either alone or in combination with 2, 4-D EE. In general, herbicide mixtures caused poor stand and as a consequence, yield reduction. An effective alternative to hand weeding was found to be application of either thiobencarb at 1.25 kg ai/ha or pretilachlor (Safener) 0.45 kg ai/ha on 8 DAS (5.7 t/ha) followed by one hand weeding at Coimbatore.

In the wet seeded lowland rice cultivation pre-emergence application of Sofit at 0.3 kg ai/ha on 4 DAS followed by one hand weeding on 40 DAS is best alternative to hand weeding twice. The above two practices have registered 8770 and 8750 kg/ha of rice grain yield and 84.2 and 78.7 of weed control efficiency respectively.

The optimum level of 'N' for direct seeded lowland rice ADT 36 was found to be 125 kg/ha and for a single crop IR 20 rice at 150 kg N/ha at Madurai. The increase in yield in ADT 36 at 125 kg N/ha and in IR 20 at 150 kg N/ha were 425 and 360 kg/ha. During both the seasons, application of 50% N at 15 DAS + 25 % at AT + 25 % at PI is the ideal time of application of N instead of 50% basal at sowing + 25% at AT and 25% at PI stage.

Studies on the iron requirement for rice in Cauvery delta soils revealed that application of 50 kg/ha of $FeSo_4$ had recorded significantly highest grain yield both in Kuruvai and Thaladi seasons, the yield increase being 41 and 20% over control (0 Fe). Due to the application of $FeSo_4$ @ 50 kg/ha, a net profit of Rs. 3500/- per hectare/season can be obtained in Kuruvai and Thaladi seasons.

For present recommendation of 1 t of fresh *Azolla* per hectare shall be reduced to 250 kg/ha. The transportation of large quantities of *Azolla* form the production site to field is a major constraint. The studies conducted at Aduthurai so far showed that the inoculum shall be used in a lesser quantity as the biomass production is almost

similar whether on uses a large quantity or a lesser quantity. Therefore the quantum of Azolla recommended for both nursery and main field shall be reduced.

Az 204 M as an elite Azospirillum strain. The evaluation of the upgraded *Azospirillum* strain AZ 204 M (mutant) and AZ 204 PS (Parent) strains in on station trials conducted at Coimbatore, Aduthurai and Ambasamudram revealed the superior nature of Az 204 M strain in enhancing the grain yield by 14 - 16 %. The use of the mutant strain in commercial inoculation will also facilitate easy and strict quality control as it possesses antibiotic resistance to kanamycin and tetracycline and this trait shall be used as a marker for detecting the quality of the inoculant supplied.

Studies on the iron requirement for rice in Cauvery delta soils revealed that application of 50 kg/ha of $FeSo_4$ had recorded significantly highest grain yield both in Kuruvai and Thaladi seasons, the yield increases being 41 and 20% over control (0 Fe) Due to the application of $FeSo_4$ @ kg/ha, a net profit of Rs.3500/- per hectare/ season can be obtained in Kuruvai and Thaladi seasons.

On farm water management study was taken up in farmers holding at Salangaipalayam for three years in rice during kharif. The technology package viz., irrigating rice crop to 5 cm depth once in four days, introduction of shorter duration rice variety ADT 38 as against IR 20, application of Zinc sulphate 25 kg/ha, application of Azospirillum, pre emergence application of Butachalor at 1.25 kg ai/ha + one hand weeding and timely plant protection measures, were compared with the farmers practice. The result indicated that the above improved technology package increased the grain yield of twice by 27.7% and net return by Rs 4394/- ha over the exiting farmers practice under Bhavanisagar.

With objective of finding out the water requirement and suitable rice variety under delayed release of water in the LBP canal and experiment was conducted for three years during rabi season with four levels of irrigation and five varieties during 1991 and 1992 and six varieties during 1993 The results revealed that irrigating rice crop to 5 cm depth three days after disappearance of ponded water had resulted in the saving of water to the extend of 20.7% over one day after disappearance and 41.0% over continued maintenance of 5 cm. Among the varieties tested, ADT 38 had recorded highest grain yield over all the three years tested and can be grown advantageously when the release of water is delayed upto September.

With a view to study the feasibility of rice cum fish culture for LBP area, experiments were conducted during 1991-92 and 1992-93 with farmer's practice of Rice (ADT 36) Rice (ADT 38) - Maize (Co 1) in 0.85 acre - fish culture (0.15) acre. A

fish pond size of 600 M^2 was dug to a depth of 2.0 M. The fist fingerlings of common carp, catla and mirgal were stocked in the fish pond (1:1:1) to a density of 3000 nos/ha. The comparative economics revealed that integrated farming system of rice (ADT 36)-Rice (ADT 38)-Maize (Co 1) + fishculture from draining the excess water from surrounding rice field increased the net return by Rs. 6383 and Rs. 5795/ha over farmer's practice of rice-rice-blackgram.

Field experiments were conducted at Bhavanisagar during Samba season of 1991 and 1992 and summer season of 1992-93 to find out optimum time of planting and irrigation supplies of rice-groundnut system with four different dates of sowing and three irrigation regimes. The result clearly showed that four rice-groundnut system, planting rice in second week of August with irrigation to a depth of 5 cm at once in 4 days and sowing groundnut during the first fortnight of January with irrigation at 0.6 IW/CPE ratio (once in 10-12 days) were optimum for higher yield (1183 kg/ha) and better water use (375 mm).

Integrated nutrient management studies in lowland rice conducted at Coimbatore brought out that fertilizer N could be saved to the extent of 25 kg/ha when *Sesbania rostrata* was applied. Similarly, Azolla could also save 25 kg N/ha.

Soil application of enriched rock phosphate with farmyard manure @ recommended level of P_2O_5 at the ratio of 1:15 enhanced the grain yield of ADT 36 rice during the I and II crops (5472 and 3534 kg/ha respectively) in the Periyar Vaigai command area. Besides higher response of rice under both the seasons, the residual availability of phosphorus from MRP was found to be significantly higher than single super phosphate.

Application of natural zinc chelate @ 2 kg $ZnSO_4$ in 750 kg coirpith compost/ha for Kuruvai and 4 kg $ZnSO_4$ in 750 kg coirpith compost for Thaladi recorded the highest grain yield of rice, at Aduthurai. This suggests a saving of 44 kg zinc sulphate/ha. Further the FYM (750 kg) enriched with 4 kg $ZnSO_4$ when applied continuously for Kuruvai and Thaladi also gave higher grain yield. The profit for the coirpith composted zinc sulphate for both the seasons was found to be Rs. 2614/- over the 25 kg Zinc sulphate applied for both the seasons.

Natural zinc chelate can be prepared with 750 kg of raw coirpith, 4 bottles of mother spawn + 4 kg of urea and 4 kg of Zinc sulphate. The methodology of natural zinc chelating is similar to the coirpith composting. Here, we have to use only 750 kg coirpith in 12 layers @ 60 kg/layer. A shaded area of 8 x 5 m is marked and first 60 kg of coirpith is to be spread uniformly to 2.5 cm height and one bottle of *Pleurotus*

mother spawn is spread and the second layer of 60 kg coirpith is spread and 1 kg of urea is to be applied uniformly and it is covered with third layer of 60 kg coirpith. Then 1 kg of well powdered zinc sulphate is applied and again covered with 60 kg coirpith. This process is to be continued upto the 12th layer and apply the last 1 kg of $ZnSO_4$ and cover with the remaining 30 kg of coirpith. Maintain the moisture of the coirpith at 200% by sprinkling 2-3 buckets of water daily on the heap. The heap is left as much for thirty days. After thirty days the analysis of the zinc chelated coirpith can be tested with 0.05 M DTPA. This natural zinc chelate can be evaluated in rice for response pattern.

A reduction on the nitrogen application in the recommended dose is advocated whenever biofertilizer is used. But whether this reduction is to be effected in all splits or an application can be stopped is still not known. This was investigated with *Azolla* biofertilizer in ADT 36 rice in Kuruvai '93 season at Aduthurai. It was found that the 2nd top dressing of N fertilizer can be skipped saving labour cost.

To maximise the rice yield in medium duration rice varieties and during the second crop season in Periyar-Vaigai command area, field experiments were conducted with two plant densities (50 and 66 hills/m²), two N levels (100 and 150 kg N/ha) and six rice genotypes viz., ADT 38, ADT 39, Co 43, Co 45, [illegible] and IR 20. The results indicated that planting at 66 hills/m² found to register higher yield (5220 kg/ha) than 50 hills/m² (4218 kg/ha). Application of 150 kg N had improved the yield by 9% over 100 kg N/ha. As regard to the performance of genotypes ADT 39 has given higher yield (5098 kg/ha) than the other genotypes. Next in the order of performance was ADT 38 (4828 kg/ha) and IR 20 (4781 kg/ha).

Dependency on the same herbicide in any crop would lead to shift in the weed flora inviting problem of resistance of certain weeds to the herbicide used repeatedly. Among the new herbicides tested in transplanted rice at Coimbatore, oxyfluorfen (WP) 0.1 kg ai/ha and cinmethalin (EC) 0.08 kg ai/ha were found to be more effective and they gave higher rice yield than conventionally used herbicides viz., butachlor (EC) 1.25 kg ai/ha and thiobencarb (EC) 1.25 kg ai/ha.

Planting of rice ADT 36 in Cauvery delta zone from second to fourth week of February recorded the highest grain yield in summer season. Higher grain yield was recorded in 80 hills/m² than with 66 hills/m². In Kuruvai season planting of rice ADT 36 during the first and second week of July recorded the highest grain yield. The grain yield was higher with 80 hills/m² than 66 hills/m². This can be adopted in Cauvery delta zone.

For rainfed rice cultivation at Ramnad, 15th September to 1st October sowing is the optimum period for premonsoon sowing to get higher yield (2563 kg/ha for 15th September and 2520 kg/ha of grain for 1st October) as the probability of 20 mm rainfall was more than 50% thereafter.

Application of green manure @ 5 t/ha for every crop along with the application of $ZnSO_4$ @ 0.5% foliar spraying at 30, 40, 50 days after transplanting gave maximum rice yield at Tirur.

Biofertilizers improves the quality of field impounded water. Biofertilizers like BGA and *Azolla* enhances the dissolved oxygen content in field impounded water and also reduces its hardness thereby improving its quality. BGA was relatively more effective in both these functions than *Azolla*. However the use of both these biofertilizers in rice fields creates a favourable condition for rice growth particularly on continuously submerged soils. The oxygenation of water and soil by these biofertilizers also reduces the accumulation of reduced substances particularly ferrous iron in fields to levels enimical of plant growth.

★ High temperature tolerant strain of *Azolla microphylla* has been identified at Coimbatore

★ Seed hardening treatment with 1.0% $CaCl_2$ in PMK 1 rice at Madurai and foliar spray of 3.0% Kaolin at vegetative and reproductive stages has increased the grain yield by 33.0% over control under rainfed condition

★ Magnetic fotification of rice ADT 36 at Madurai increased the grain yield by 24% as compared to control (5765 kg/ha) under irrigated conditions.

★ Application of methanol (10%) at flowering stage in rice ADT 36 increased the grain yield by 14.0% over control (6300 kg/ha) under irrigated conditions at Madurai.

Field experiments conducted at Coimbatore with IR 50 rice showed that the foliar application of cytozyme @ 0.1% at 30 DAS in rice increased plant height, LAD, Chlorophyll content, dry matter production, nutrient content and uptake besides yield and its components. The yield increase was 7.9% compared to NPK control.

Raising *Sesbania rostrata* as intercrop at a spacing of 2.5 m apart in two rows or incorporation of *Sesbania rostrata* or *Sesbania speciosa* before planting and application of soil test based N, P and K fertilizers can be recommended for getting higher grain yield in rice in Thambiraparani Command area.

Dry dressing of processed paddy seeds of IR 20 with calcium oxychloride ie., bleaching powder (@ 10 g/kg of seed) and storing them in gunny bag helped to maintain high viability (82%) and vigour up to 8 months even under unfavourable storage places like Chengai MGR district. The untreated counter-part seeds recorded only 68% germination and poor vigour after 8 months.

Dry dressing of JJ 92 seeds with carbendazim (4 g/kg) and packing them in 600 gauge polyethylene bag maintained 80% germination up to 10 months under delta conditions.

Integrated nutrient management for rice under Sodic soil conducted for 2 years at Trichy with IR 20 and Co 42 rice varieties revealed that 100% soil test based fertilizer recommendation + 50% Gypsum requirement + greenleaf manure @ 5 t/ha + $ZnSO_4$ @ 25 kg/ha + Azospirillum (root dipping) was found superior in recording highest yield of 4.5 t/ha with IR 20 and 4.87 t/ha with Co 43 rice.

Field trials conducted at Trichy to study the field effect of seed treatment on the physiology of cotton in sodic soil for 3 years recorded that $CaSO_4$ at 1% level was much effective in recording highest plant height (67.8 cm), leaf area 1316 cm^2/pl.) dry matter production (74.9 g/pl.) and kapas yield (994 kg/ha).

Crop Protection

Pest and diseases of JJ 92 can be managed by effectively by applying carbofuran 3G @ 3.5 kg/20 cents nursery followed by spraying of edifenphos @ 250 ml/ha on 30 and 45 DAT, Carbendazim 50 WP @ 250 g/ha on 35 DAT, as well as need based insecticidal sprays against pests under Chengleput conditions. The yield and net profit over untreated check were significantly higher in the above treatment when compared to the regular nursery treatment followed by application of plant protection chemicals as and when pests and diseases were observed.

Foliar spraying of fresh cowdung extract 20 per cent twice (starting from initial appearance of disease and another at fortnightly interval) was equally effective as the standard recommendation of antibiotics in the management of bacterial leaf blight disease of rice under Aduthurai conditions.

Prosopis leaf powder extract (10%) Ipomea leaf powder extract (10%) and Neem oil (3%) were either on par or next to NSKE (5%) treatments in reducing sheath rot incidence and intensity. In respect of grain yield, these three treatments were nest to that of NSKE and Carbendazim treatments in all the three trials and were significantly superior to untreated check.

Foliar spray twice with NSKE (5%) at boot leaf stage and 10 days (DL) continues to record significantly the lowest incidence and intensity of sheath rot with maximum grain yield and it was on par with Carbendazim (0.1%) while untreated control recorded highest incidence and intensity of disease with minimum grain yield

The field trials conducted at Aduthurai during 1990 - '91, 1992 - '93 and 1993 - '94 revealed that spraying of neem oil 3 per cent and NSKE 5 per cent was found to reduce the bacterial leaf blight disease as well as increasing the grain yield significantly compared to untreated control than the present standard recommendation of antibiotics

Application of *Bacillus thuringiensis* var. *Kurstake* @ 1.0 kg/ha followed by application of either monocrotophos or quinalphos 1000 ml/ha 2 days thereafter, recorded minimum leaf folder damage and higher yield when compared to application of *B. Thuringiensis* var. *Kurstake* or insecticide alone.

Spraying of 10% Prosopis leaf extract to rice crop on 30 and 45 days after transplanting (at 500 l/ha) reduced the PDI value of the rice blast disease to 39.3 as against 60.0 in control. The PDI value recorded from carbandazim treatment (recommended fungicide) was 38.9 which was on par with *Prosopis leaf extract*. The yield recorded from Prosopis leaf extract spray and carbendazim treatments were 4025 and 4165 Kg per ha respectively and were significantly higher than the yield obtained from control (2596 Kg/ha). Although the yield obtained from Prosopis leaf extract treatment and catbendazim were similar, the cost benefit ratio obtained from Prosopic leaf extract treatment was higher (1:11.9) than the cost benefit ratio obtained from catbendazim treatment (1:7.3).

Paddy seeds treated with 3% cowdung ash was found to be effective against sitotraga cerealella in storage without effecting germination

Two sprays with Iprobenphos (Kitazin) 0.1% first after symptom appearance and 15 days later reduced the sheath blight incidence and increased yield compared to carbendazim at Coimbatore. Chlorothalonil was on par with present recommendation - catbendazim. It was followed by Bitertanol.

Toxin activity in crude filtrate of *Rhizoctonia solani* causing rice sheath blight was detected in fractions 9 to 10 after purifying through Sephadex G - 100 column. This will be useful for rapid screening of rice varieties.

MILLETS

SORGHUM

Crop Management

Variety released

BSR 1: A high yielding dual purpose sorghum culture ICSV 239 has been released during this year as BSR 1 cholam for the benefit of the farmers of the Western Zone. It is a multiple cross derivative involving (SC 108 - 3 X ICSV 4 16-3-1 X (MR 801 X R 2751, 4-1-1). It matures in about 105 days and moderately resistant to earhead bug. It is suitable for both kharif and summer irrigated cropping. The 1000 grain weight is 4 gram more than (31.5) Co 26 (27.8). The mean yield per hectare is about 3000 - 3500 in Kharif and 6000 - 6500 in summer.

Promising Cultures

VS 47 : It is a Thalaivirichan cholam type with a crop duration of 140 days as against 160 days of Co 19. It recorded an increased yield of 15.7 and 17.1 per cent over Co 19 and Paiyur 1 respectively. On an average it has a yield potential of 925 kg/ha. This culture will be released as a variety suitable for cultivation in North Arcot Ambedkar district.

KS 7657 : It is a grain cum fodder culture. It is superior to K 10 in respect of grain and fodder yield. This culture recorded a mean dry fodder yield of 8.48 t/ha as against 7.27 t/ha realised from K 10. The increase in fodder yield was 17 per cent over K 10. Its average grain yield is 1.72 t/ha.

IS 14293-1, IS 15845, IS 14838 - 1 and IS 19324 - 1 : These red grain cholam cultures were found promising under rainfed conditions. In the on-farm trials conducted during 1993, the mean grain yield registered by these cultures were 1832, 1560, 1428, 1445 and 1152 kg/ha respectively as against Co 4 which recorded only 810 kg/ha.

TNS 265 and TNS 47 : These promising cultures recorded a mean grain yield of 2465 kg/ha and 2491 kg/ha as against 2186 kg/ha recorded by Co 26 with an increase of 12.8 % and 14.0% respectively.

Crop Management

For rainfed Sorgum application of composted coirpith at 12.5 t/ha plus a fertilizer dose of 40:20 NP/ha and sowing in flat bed followed by ridging later gave higher yield and returns under Coimbatore conditions.

Field experiments conducted in Coimbatore to study the frequency of Zn application to sorghum - cotton cropping system indicated that applications of zinc at 5.0 kg/ha i.e. 25 kg $ZnSo_4$/ha once after 3rd crop is sufficient to get economic return. Though application of zinc sulphate for every crop increased the yield, it is not economical.

The use efficiency of Zn by sorghum in Zn deficient black clay loam soil (Typic ustropept) for the graded levels of Zn was precisely assessed at Coimbatore using ^{65}Zn under potculture condition. The uptake of ^{65}Zn by Co 26 sorghum from the fertilizer were 0.69, 1.41 and 2.19 mg/pot for 2.5, 5.0 and 7.5 kg Zn/ha levels respectively. Eventhough there is linear trend for the uptake of ^{65}Zn from fertilisers, there was no marked variation for the levels.

The comparative efficiency of three source of P Viz., super phosphate, (SSP) Diammonium phosphate (DAP) and Rock phosphate (RP) applied as such and enriched FYM alone as well as with phosphobacterium was studied in sorghum using ^{32}P at Coimbatore. The grain and straw yield were significantly increased by Diammonium phosphate and super phosphate compared to Rock phosphate. Application of P enriched FYM was better compared to *per se* application. Phosphobacterium did not show any additional advantage on yield and available P content of soil.

Application of fertilisers based on prescription equations for 40 Q/ha target for vertisol soils under rainfed condition ($N:P_2O_5:k_2O$ at 27-27-34 kg/ha) at Coimbatore resulted in increased net profit of Rs. 860/ha in Sorghum compared to blanket recommendation.

For the production of the parential lines of CoH4 viz., 296 A and TNS 30, a planting ratio of 4:2 (Female : Male) with a spacing of 45X15 cm and application of 100:50:50 kg NPK/ha can be adopted for getting higher seed yield.

Hydration dehydration treatment to stored seeds of CoH$ sorghum hybrid and pearlmillet genotypes with disodium phosphate (10^{-4} M) for 3 hours followed by drying back to the original moisture content prolonged the shelf life of seeds up to 12 months.

CROP PROTECTION

Sorghum entry RB 055-2 was found to be resistant to both shoot fly and stem borer. The usefulness of this culture is being examined.

PEARL MILLET

CROP IMPROVEMENT

Promising Cultures

ABH 219 (L III A X PT 1890) : This culture recorded a mean yield of 1938 kg/ha which is on par with the standard check x 6. The superiority of this culture will be tested for one more year under ART trials.

CROP MANAGEMENT

Application of *Azospirillum* and *Phosphobacterium* along with 75 per cent of the recommended level of N and P registered more grain yield in pearl millet WCC 75 and cholam paiyur 1 besides saving 25 % of N and p under rainfed conditions at Paiyur. The results of the on farm trials also clearly indicated that there was a possibility of saving 25% of N and P under rainfed conditions.

On farm trial in pearl millet conducted at Kalingapatti, Sathur block, Kamarajar district in order to test varify the combined inoculation of Azospirillum and phosphobacteria at 75 % of the recommended dose of N and P (30 : 15 kg/ha) revealed that the combined inoculation of biofertilizer at 75% of the recommended dose had registered highest grain yield of 2500 kg/ha and was comparable with full dose of recommended levels 2450 kg/ha).

A trial conducted during the rabi, 1993 -'94 at Kovilpatti to study the effect of Phosphorus and bio- fertilizers viz. Azospirillum and Phosphobacteria on grain yield of Cumbu revealed that the highest yield of 1750 kg/ha was obtained with the application of phosphorus 40 kg/ha (Mussorie rock phosphate and with Phosphobacteria).

The textural profile of seeds could be used as an index for storability in sorghum and pearl millet. The seeds treated with thiram + Carbaryl (2 g + 200 mg/kg of seed) and packed in 700 gauge polyethylene bag prolonged the shelf life and vigour of seeds.

MAIZE

CROP IMPROVEMENT

Promising Cultures

UM H 10 (UMI 101 X UMT 130) / UMI 90 X UMI 285) : It is in advanced stage of testing Multilocation trials were conducted during 1992 - 93 at different research stations of TNAU. The new hybrid recorded a mean grain yield of 4358 kg/ha with an increase of 23.2, 16.9, 31.3 % over Co1, CoH2 and Ganga 5 respectively. During 1992 - 93 twenty four Adaptive Research Trials were conducted and the hybrid recorded a mean grain yield of 3900 kg/ha as compared to 3448 kg/ha of Co H. The highest yield recorded was 7200 kg/ha which is found to be suited to both rainfed and irrigated situations and is resistant to downy mildew. It matures in 100 days. The grains are flint with attractive yellow colour and high carotene.

Pre - monsoon sowing of maize during 37th standard week (15th September) registered 42 per cent higher yield over sowing with the on set of monsoon (40 th standard week). This simple, effective low cost technology could be profitably used in vertisols of Coimbatore tract

CROP MANAGEMENT

Field experiments conducted at Coimbatore with maize using raw organics like FYM, leaf litter, coir pith sugarcane trash, ipomea and press mud and chelated organics of the above sources with P, K, Zn and Fe indicated that the chelated forms are superior to raw organics of the respective source. Fortified / enriched source of FYM recorded significantly higher grain and straw yield of 7033 kg/ha and 14890 kg/ha respectively. Inorganics alone applied treatment recorded the grain yield of 5089 kg/ha. The enriched FYM recorded 38.2 per cent higher grain yield over inorganics alone. Enriched press mud source recorded 24.1 per cent higher grain yield over inorganics alone.

A field experiment was conducted at Coimbatore with Co 1 maize to study the possibilities of utilization of wastes like bioearth, protein products sludge, mushroom spent compost, pressmud, sewage sludge and composted coir pith. These were compared with FYM at 100%, 75% and 50 % NPK levels. The highest grain yield (3.23 t/ha) was obtained with 100% NPK + FYM, followed by NPK + pressmud (3.18 t/ha) and NPK + sewage sludge (3.12 t/ha). With regard to stover yield FYM + 100% NPK recorded higher yield (11.67 t/ha) followed by protein product sludge + NPK

(10.17 t/ha) and mushroom spent compost + NPK (9.17 t/ha). In the absence of FYM availability these solid wastes can be profitably utilized as source of organic manure.

A study on the interaction of tillage with different levels of N studied in vertisol soils of Coimbatore indicated that the grain yield of sorghum (Co 26) was significantly increased by the tillage operation consisting of mould broad ploughing (One) + Disc barrowing (twice) 2232 kg/ha compared to the farmer's practice viz., country ploughing (thrice) and this increase accounted to 29.3%. Among the graded levels of N (100, 135 and 170 kg N/ha), 135 kg N/ha was good and economical.

A study on the response of maize for N levels conducted at Coimbatore with Maize Co 1 raised in Rabi indicated that the level of 100 kg N/ha was found to be optimum and economical.

The grain and straw yield of 55th crop of maize raised in long term fertiliser experiments at Coimbatore revealed that as in the past higher grain and straw yields were obtained 100% optimum NPK + FYM treatment. Continuous exclusion of K S from the fertiliser schedule did not result in yield reduction. Continuous addition of N alone reduced the yield distinctly due to P becoming the limiting nutrient.

RAGI

CROP MANAGEMENT

Promising Cultures

TNAU 511 (Indaf 1 X TNAU 303/2-3) : It is a potential short duration high yielding ragi which matures in 105 days. Under irrigated conditions this has registered 14% higher grain yield over the standard check Paiyur 1 under Adaptive Research Trials. This is a highly drought tolerant genotype, tolerant to pests and diseases having a good stability of performance over varied environment under Tamil Nadu conditions. The mean finger number of this culture is eight ranging from 6 to 15 per earhead.

DPI 1839 : This culture has been found promising under rainfed conditions by recording a mean grain yield of 1404 kg/ha as against 1228 kg/ha by Paiyur 1. This will be tested in MLT during 1994 - 95 kharif season.

CROP MANAGEMENT

In rain fed ragi at Paiyur foliar spraying of Ethrel 200 ppm on 45th and 65th day after sowing was found to enhance maturity of the crop by one week as compared to control. The plots sprayed with ehtrel registered 1925 kg of grain and 4000 kg of straw per hectare as compared to control with 1225 and 3200 kg/ha of grain and straw respectively.

An integrated nutrient management approach has been adopted to overcome soil constraints like poor organic matter low CEC, poor WHC, low soil fertility and to exploit the yield potential of crops like groundnut, ragi and horsegram in Vannapatti soil series of Paiyur. The results revealed that addition of tank silt/black soil at the rate of 80 t/ha accounted for marked increase in the yield of ragi (Paiyur 1) from 1270 kg/ha to 1880 kg/ha and in groundnut (TMV 7) from 1022 to 1618 kg/ha. Further the addition of tank silt/black soil had a very good residual effect on horsegram by increasing the yield from 360 kg to 600 kg/ha. Besides, it also improved the soil organic matter content, CEC, WHC and fertility of soil.

A study on the requirement of tillage operations for ragi for red soils (Somayanur series) at Coimbatore indicated that one disc plouhing recorded the highest grain yield of 30.1 q/ha compared to farmers's practice of two country ploughing (25.9 q/ha) by improving physical properties.

SMALL MILLETS

TENAI

CROP IMPROVEMENT

Variety Released

CO 6:

A new Tenai variety Co 6 was released during 1994 January. It was developed by recombination breeding involving Co 5 and ISE 301. This culture was tested under various trials as TNAU 43. Co 6 is a highly tillering variety which matures in 85-90 days. It has recorded a mean grain yield of 1565 kg/ha and fodder yield of 3.7 tonnes/ha, while the check Co 5 recorded only 1413 kg/ha. In All India trials, the overall mean of 59 locations conducted for the past four years was 1471 kg/ha which is 26 to 29% higher than the national check Arjuna and Sla 326. Co 6 (TNAU 43) has already been released as All India variety. In addition to high yield potential Co 6 is endowed with drought tolerance to major pests and diseases. This variety also scores for grain yield with high protein, fat and minerals than the check.

SAMAI

CROP IMPROVEMENT

Promising cultures

Three promising short duration samai cultures viz., BAU 3 (1021 kg/ha), PM 295 (995 kg/ha) and IPM 59 (1005 kg/ha) were found promising well under rainfed condition. They have recorded 19 to 22% increased yield over Paiyur 1 and 23 to 27% over Co 2.

CROP MANAGEMENT

Presoaking of samai seeds with potassium dihydrogen phosphate at 2% or coconut water at 10% was found to be best in maintaining the crop stand and height of the plant during crop growth period and gave substantial grain yield of 720 and 715 kg/ha respectively as compared to control with 568 kg/ha under rainfed condition at Paiyur.

PULSES

REDGRAM

CROP IMPROVEMENT

Variety Released

CoH 1: This hybrid redgram was released for the benefit of farmers in January 1994. The parentage of this hybrid is Ms T 21 X ICPL 87109. This hybrid yields 49 percent more than the ICRISAT hybrid ICPH 8 and 30 percent more than the varieties ICPL 87, Co 5 and Vamban-1. The average yield of this hybrid is 950 kg/ha. The protein content of the Dhal is 22.3 per cent. This hybrid is suitable for both rainfed and irrigated conditions.

Promising cultures

ARH 102: This culture matures in about 100 days with an average grain yield of 1453 kg/ha. The increase in yield was 83% and 150% over the checks ICPL 87 and Vamban 1 respectively. This culture will be tested in the rainfed vertisols of Kamarajar and Chidambaranar districts.

CPH 953: This hybrid was tested in adaptive research trials during Kharif '94 in 50 locations spread over 12 districts of Tamil Nadu. In the multilocation trials conducted during Kharif '93, it has recorded 26.0 per cent higher seed yield over the check hybrid ICPH 8 and 35 per cent over ICPL 87, 44 per cent over Co 5 and 38.0 per cent over Vamban 1.

Co RG 9301: It is a derivative of a cross Ms Prabhat DT X ICPL 7035 has been entered in MLT during Kharif '94, along with check Vamban 1. At the station trials, it has out yielded the check hybrid ICPH 8 and the varieties Vamban 1, Co 5 and ICPL 87 by 15 per cent.

CROP MANAGEMENT

Weed management studies integrating manual and chemical methods were undertaken in both irrigated and rainfed redgram at Coimbatore. Pre-emergence application of pendimethalin at 1 kg ai / ha followed by one hand weeding gave yield and EC ratio comparable to that of hand weeding twice. It was followed by pre-emergence application of fluchloralin at 1 kg ai / ha followed by one hand weeding for irrigated redgram. Pre-emergence pendimethalin at 1 kg ai / ha followed by post-emergence fluazifop butyl at 0.25 kg ai / ha gave yield and BC ratio almost similar to hand weeding twice. It was followed by pre-emergence application of pendimethalin at 1 Kg ai / ha integrated with one hand weeding later for rainfed redgram.

The pigeon pea hybrid ICPH 8 produced during kharif had better seed quality than did in summer. A planting ratio of 1:6 (Male: Female) and application of 30:60:20 Kg NPK ha^{-1} is to be adopted. Two foliar sprays of DAP 2% one at 50% flowering and the second at 10 days after augumented the seed yield and seed quality. The seeds attain physiological maturity 35 days after 50% flowering accompanied by change of pod colour from green to brown. The hybrid seeds can be processed using 11/64" sieve. The seeds dried to 8% moisture content and treated either with activated clay (10 g/kg) or Thiram (2 g/kg) and packed in 600 guage polythene bag prevented bruchid and maintained 80 germniation upto 8 months under ambient condition. Seed parent (MS prabhat DT) has better storage potential than the pollinator (ICPL 161) or the hybrid (ICPH 8).

Soil application of different organic residues (Pressmud, Farm Yard Manure, Sheep manure, BDS and composted coir pith waste) @ 5 t/ha with the seed bacterization of *Rhizobium* recorded better symbiosis in Vamban 1 redgram. Among

the organic residues, soil application BDS with *Rhizobium* (CC 1) recorded 32.1 % increased grain yield over untreated control.

Pre-emergence application of fluchloralin @ 1 kg/ha followed by hand weeding on 25 DAS recorded higher yield of 991 kg in redgram and 342 kg in groundnut under redgram+groundnut intercropping system than other weed control methods studied at Vamban.

BLACKGRAM

CROP IMPROVEMENT

Variety Released

K 1: The blackgram culture KBG 512 (Co 3 X Us 131) has been released as K 1 blackgram from Kovilpatti during January 1994 based on its overall performance in station trials, MLT and ART. It has recorded an average grain yield of 707 kg/ha with 29% increased yield over the check Co 5. It matures in 70 - 75 days. It is drought tolerant and recommended for cultivation in Southern districts of Tamil Nadu during Purattasi Pattam. (September - October to December - January) both as pure crop and inter crop in cotton.

Promising Cultures

CO BG 301 : This culture was found to be significantly superior to the check Co 5. While the culture recorded 333 kg/ha, the check gave 266 kg/ha. The increase in yield was 25.2 per cent.

The hybrid derivatives viz., x 3-12 (Co 4 X LBG 308) and x 2-2 (ADT 4 X LBG 17) registered 675 and 615 kg of seeds per hectare compared to 479 kg/ha by the check Co 5. The increase recorded were 3.05 and 28.4 per cent. These cultures will be evaluated to their reaction to YMV at Vamban centre through shuttle breeding.

Vamban 11 is advanced promising blackgram cultur resistant to yellow mosaic virus disease. It recorded an average grain yield of 530 kg/ha in multilocation trial during 1993 kharif season and is proposed for Adaptive Research Trial during 1994.

COBG 500, COBG 523, COBG 506 : These three cultures were found to record 604, 583 and 573 kg of seeds per hectare while the check recorded 437 kg/ha. The increase in field over CO 5 was 58.2, 33.4 and 31.1 per cent respectively.

Blackgram
Kovilpatti
(K.) 1

Coconut
Veppankulam
(VPM.) 3

CROP MANAGEMENT

The rhizphial strain COC 10 was found to be better than the existing strain BMBS - P4T in increasing the grain yield of blackgram. The increase in grain field accounted to 17.0 per cent.

Two years of field studies at Vamban on the influence of sulphur nutrition on the rainfed blackgram and greengram revealed that combined application of phosphorus and sulphur at the rate of phosphorus and sulphur at the rate of 40 kg/hs each in the form ofDAP and gypsum registered increased seed yield of 71 per cent over control.

A field trial was conducted at Koilpatti to study the effect of different land treatments on the moisture conservation in dry pulses. Medium + shallow tillage coupled with compartmental bunding had recorded highest grain yield of 349 kg/ha in blackgram Co 5. Similarly soil moisture content was also higher (19 - 20 per cent) in compartmental bunded plots receiving medium and shallow tillage.

Experiment conducted at Bhavanisagar during Kharif 1993 in red soil indicated that soil application of K at 15 kg/ha gave the highest seed yield of blackgram 807 kg/ha and was superior to 10 and 0 kg/ha. With regard to micronutrient spray, foliar spray, foliar spraying of $CuSo_4$ at 0.5% at flowering stage registered higher seed yield of 737 kg/ha and it was comparable with 0.5% spray of $ZnSo_4$ (712 kg.ha) and $MnSo_4$ (710 kg/ha) but was superior to $FeSo_4$ spray.

CROP PROTECTION

Seed treatment of blackgram with carbosium @ 3% and 4% reduced the damage by stermfly, bug beetle and aphid significantly.

In blackgram, the root knot namatode, *Meloidogyne incognita* adversely affects the symbiotic process of nitrogen fixation by Rhizobium spp. by 29.5 per cent.

GREEN GRAM

CROP MANAGEMENT

Promising Cultures

89047 : This promising greengram culture has been isolated at Coimbatore. This culture was tested in 180 trials under ART during 1993 - 94.

KGG 373 (Co4 X ML 65 - 3 - 4) : During the past three years, the greengram culture KGG 373 (C0 4 X ML 65 - 3 - 4) with the duration of 75 days has performed well registered a mean grain yield of 909 kgs/ha with 24.7 increase over the check Co 5. It has been entered into Adaptive Research Trials on farmers holdings in Southern districts of Tamil Nadu under rainfed vertisol during 1994 Rabi season.

CROP MANAGEMENT

The rhizodial strain Cog 15 was found to be a better strain in increasing the grain yield of greengram over the standard strain CMBS 1. The increase in yield accounted for 7.5 per cent over the standard strain CMBS 1.

Application of 40 kg S/ha in the form of gypsum recorded higher grain yield of 653 kg ha in greengram at Vamban. Application of 20 kg s/ha through gypsum along with 115 kg DAP/ha recorded maximum grain yield in redgram and blackgram.

Along with the *Rhizobium*, coinoculation of *Trichoderma viride* @ 4 g/kg of greengram Vamban 1 recorded better symbiosis over their individual inoculations.

Soil application of biodiegested slurry @ 5 t/ha with seed inoculation of *Rhizobium* (3 A1 3) and *Bacilus megatherium* recorded 26.8% increased grain yield in Vamban 1 greengram.

COW PEA

CROP IMPROVEMENT

Promising Cultures

VCP 8 : It is a vegetable type. It is a selection from IT 81D 228 with an yield potential of 6 tonnes of green pods/ha has out yielded the check variety Co 2 (5 tonnes of green pods/ha) by 20% in onfarm trials. It comes to picking on 60 days onwards after sowing and yields upto 85 days.

VCP 8 : A white seeded cowpea genotype VCP 8, a selection from IT 85F 2020 which matures in 63 days with an average grain yielded of 1200 kg/ha has out - yielded the check variety Pusa 152 (900 kg/ha) by 33%. It is proposed for testing under ART during 1994.

GC - 82 - 7 (KCP 1) : During the past three years, the cowpea entry GC - 82 - 7 (KCP 1) with a duration of 80 days has performed well by registering a mean grain

yield of 1148 kg/ha with 27.3% increased yield over the check Co4. It has been entered into Adaptive Research Trials on farments holdings in Southern districts of Tamil Nadu during 1994 Rabi rainfed season.

CROP MANAGEMENT

The study conducted at Vamban revealed that application of 20 kg K_2O/ha for rainfed pulses viz., cowpea, blackgram and greengram increased the yield to the tune of 30 per cent over control (no application of potassium).

Dual inoculation of *Rhizpbium* with *Bacillus magatherium* recorded 39.6 % increased grain yield in Pusa 152 cowpea in the acid soils of Vamban.

CROP PROTECTION

Two sprays with chlorothalonil 0.1% or one spray with 0.1% chlorothalonil followed by 3% neem oil, after the appearance of the diseases and after 10 days of first spray significantly reduced cowpea rust caused by *Uromyces appendiculatus* and increased the yield to 594 kg/ha and 589 kg/ha respectively as against 3372 kg/ha in the control.

Incidence of cowpea aphid-borne mosaic virus was reduced to 25.4% by erecting sticky yellow trap at 30 cm height (12 numbers/ha smeared with castor oil at weekly intervals + growing a barrier crop of cholam (2 rows of cholam for every 5 metre length of cowpea) + spraying monocrotophos twice (500 ml/ha on 30 and 45 DAS) and by roguing diseased plants on 30 DAS while the untreated check recorded an incidence of 37.4%. The yield increase in the same treatment was 47.2% over control.

BENGAL GRAM

CROP MANAGEMENT

Promising Cultures

Under joint TNAU/ICRISAT Chickpea breeding program two lines viz. CoG 29 (Co 3 X ICC 12237) and CoG 30 (ICC 42 X ICC 12237) were found superior to the check Co 3. The entries were tested at Aruppukottai and Kovilpatti during rabi 1993 under IET in the All India Co-ordinated trial. The cultures CoG 29 and Co 30 have recorded 616 kg/ha and 574 kg/ha respectively with 23.2 and 14.8 higher seed/grain

yield over the check Co 3 (500 kg/ha). These entries are to be tested under MLT during Rabi '94-95 in the same locations.

CROP MANAGEMENT

Inoculation of the rhizobial strain Co Be 13 was found to increase the yield of bengal gram to 753 kg/ha while the standard strain CoC 10 recorded only 653 kg/ha. The increase in field accounted for 10.7%.

Among 102 entries of chickpea studied at Coimbatore for drought tolerance, nineteen entries showed drought tolerance based on drought susceptibility index, biomass and yield.

CROP PROTECTION

Biological control of root rot by combination of antagonists seed treatment with *Trichoderma viride + p.fluorescens* (4 g/kg) each was superior to T.virida alone. This combination reduced the incidence of root rot (13.5%) and increased the yield (425 kg/ha).

In chickpea, two early instar larvae/10 plants may be adopted as the ETL for *Helicoverps armigera*. The net income (Rs.5,169/ha) was higher when NPV was applied seven times rather than applied thrice (Rs.1,341/ha) based on ETL.

SOY BEAN

CROP IMPROVEMENT

Promising Cultures

UGM 52 : A short duration advanced cultures UGM 52 (a hybrid derivatives of UGM 21 x IS 335) was under ART during 1993 - 94 seasons. The culture recorded 1368 kg/ha with 14% increased yield over the check Co 1 (1184 kg/ha) in MLT. The culture UGM 52 will again be tested under ART during 1994-95.

VGM 47 : In the Initial Varietal Trial the culture VGM 47 recorded the maximum seed yield of 1753 kg/ha followed by MACS 896 with 1728 kg/ha. The check Co 1 recorded 1580 kg/ha.

CROP MANAGEMENT

With the objective of finding out the water requirement and economics with pulses-castor system, field experiments were conducted for three years with three levels of irrigation and six cropping systems at Bhavanisagar. The results indicated that among the cropping systems soybean + castor (60cm apart) system recorded the highest mean net return of Rs. 7,734 / ha with B/C ratio 2.91.With regard to levels of irrigation, irrigation at 0.60 IW/CPE ratio gave the higest net return and B/C ratio under both sole and intercropping situation. For Priyar district, soybean + castor with irrigation at 0.60 IW/CPE ratio (Once in 10.12 days) can be recommended for getting maximum benefit.

The herbicide alachlor (10% G) @ 2 kg ai/ha applied as pre-emergence spray controlled the weeds effectively in soybean and increased the grain yield and returns comparable to that of hand weeding twice.

At Bhavanisagar, soil application of K at 60 kg/ha to soybean in red soil during kharif season, recorded the highest seed yield of 1657 kg/ha and it was superior to 40 and 20 kg/ha. Among the micronutrient spray, $MnSO_4$ at 0.5% spray at flowering stage registered higher seed yield of 1577 kg/ha and it was on par with $CuSO_4$ at 0.5% (1537 kg/ha) but was superior to $ZnSO_4$ and $FeSO_4$ spray

CROP PROTECTION

There was maximum reduction of root rot (62.4%) and significant increase in yield (1436 kg/ha) of soybean by amending the soil with neem cake (150 kg/ha) in comparison with control.

HORSEGRAM

CROP IMPROVEMENT

Promising cultures

DPI 1562 and DPI 1584 : Two cultures namely DPI 1562 and DPI 1584 were found to be performing well at Paiyur under rainfed condition. These cultures recorded a mean grain yield of 959 and 882 kg/ha over three years (1991-92, 1992-93 and 1993-94) of evaluation whereas the check varieties Paiyur 1 and Co 1 recorded a mean grain yield of 779 and 721 kg/ha respectively. The yield increases were 23 and 13% over Paiyur 1 for DPI 1562 and 33 and 22% over Co 1 for DPI 1584. These two cultures have been entered into Multilocation Trials during 1994-95 season.

CROP MANAGEMENT

Presoaking of horsegram seeds with water and coconut water at 10 per cent has increased grain yield by 22 and 20 per cent over unsoaked dry seeds under rainfed condition at Paiyur.

Studies on the seed treatment, soil and foliar application of Fe and Mo to horsegram / Paiyur 1 revealed that the plots applied with 0.5% of $FeSO_4$ + 0.10% of Na-Molybdate registered the highest grain yield of 814 kg/ha as against the control plot (567 kg/ha). Foliar application of Fe and Mo was found to be better than seed treatment and soil application.

LAB LAB (Avarai and Mochai)

CROP MANAGEMENT

Promising cultures

COLT 21 and DL 3196 : A high yielding hybrid derivative COLT 21 (Avarai) and a promising mochai culture DL 3196 were lestix in OFT during 1993-94. The trials will be repeated during 1994-95 also.

CROP PROTECTION

Two sprayings of endosulfan 0.03% + NPV 250 LE/ha during flowering and pod formation stages of mochai significantly reduced the larvae of *H. armigera* when compared to spraying of endosulfan 0.07% or neem seed kernel extract 5%.

OIL SEEDS

GROUNDNUT

CROP IMPROVEMENT

Variety Released

ALR 2 :

In groundnut culture ALG 56 was released as a location specific variety ALR 2 to Pollachi tract. It is a bunch variety maturing in 105 days. It yields 1740 kg seed pods per heactare under rainfed conditions and 2550 kg/ha under irrigated situations.

It possesses high oil content of 52% and dormancy period of 15 days. This variety is fairly tolerant to rust and late leaf spot diseases and for thrips, leaf hopper and leaf miner.

BSR 1

A groundnut culture ICGS 86143 has been released as BSR 1 during this year for the Western Zone of Tamil Nadu. It is a hybrid derivative evolved from a cross between ICGS 44 x (Robut 33-1) x NCAC 2821) with a duration of 105 days. It possesses moderate resistance to rust, late leaf spot and bud necrosis and a mean yield of 2845 kg/ha, which is 17.5% and 21.6% increased yield over VRI 2 and VRI 3 respectively. It has 21 days of fresh seed dormancy. The oil content is 49.5, shelling 70.3% and SMK 82.4%. The variety is suitable for Periyar, Coimbatore, Trichengodu and Karur areas.

Promising Culture

VG 8918: Abunch groundnut culture VG 8918 is derived from the cross VG 5 x NCAC 17090. It matures in 100-105 days. In the Multilocation Trials conducted during kharif 1993 in seven locations, this culture has registered a mean pod yield of 1497 kg/ha which is 17 and 16.4 % higher than VRI 2 and ALR 2 respectively.

VG 113 : A semi-spreading groundnut culture VG 113, a derivative of *Arachis hypogaea* x *A.cardenasii* matures in 120-125 days. In the MLT conducted during kharif 1993, VG 113 has recorded a mean pod yield of 934 kg/ha as against 789 kg/ha of TMV 10, the yield increase being 18.3%.

VG 9204 : A bunch groundnut culture VG 9204 (VRI 2 x Robut 33-1) has yielded 1324 kg/ha, surpassing VRI 2 by 15%. It takes 100-105 days to mature.

ICGS 86143 : A groundnut culture ICGS 86143 has been released as BSR 1 during this year for the Western Zone of Tamil Nadu. It is a hybrid derivtive evolved from a crose between ICGS 44 x (Robut 33-1) x NCAC 2821) with a duration of 105 days. It possesses moderate resistance to rust, late leaf spot and bud necrosis and a mean yield of 2845 kg/ha, which is 17.5% and 21.6% increased yield over VRI 2 and VRI 3 respectively. It has 21 days of fresh seed dormancy. The oil content is 49.5, shelling 70.3% adn SMK 82.4%. The variety is suitable for Periyur, Coimbatore, Trichengode and Karur areas.

TNAU 256 : A bunch culture TNAU 256 derived from the cross VRI 3 x JL 24 has given 1625 kg/ha which was significantly susperior to Co2 and VRI 2 during kharif season. This has given 54% increased yield over Co2 and 78% over VRI 2 (The yield of Co2 : 1056 kg, VRI 2 : 910kg).

CROP MANAGEMENT

In a three-year study conducted at Vridhachalam, Integrated Weed Management practices of pre-emergence application of metalachlor (1.0 kg a.i./ha + one hand weeding on 30 DAS was found to be more profitable and economical for irrigated groundnut than conventional method of weed control.

Fertilizer prescription equations have been developed at Coimbatore for the dominant groundnut growing soils of Tamil Nadu. Simple nomograms of fertiliser prescription are available for adoption.

Red calcareous soils :

F	N	=	7.20 T - 0.71 SN - 0.58 ON
F	P_2O_5	=	2.24 T - 1.58 SP - 076 OP
F	K_2O	=	5.47 - 0.33 SK - 0.86 OK

Red Non-calcareous soils

F	N	=	4.59 T - 0.29 SN
F	P_2O_5	=	4.71 T - 6.39 SP
F	K_2O	=	9.01 T - 0.37 SK

(SN : Available N; SP : Available P; SK : Available - K kg/ha)

Onfarm water management was conducted at Salangaipalayam, for two years in Groundnut during January. The technology packages viz., irrigating Groundnut crop at 0.60 IW/CPE ratio, improved variety (Co2), use of biofertilizer, pre-emergence application of Fluchloralin at 2.0 liter/ha, application of gypsum at 400 kg/ha, use of micronutrient mixture at 12.5 kg/ha and timely plant protection measures were compared with the local farmers practices. The results clearly revealed that above technology package increased the yield of groundnut by 17.3% and net return by Rs. 3825/ha over farmer's practice.

At Tindivanam Prosopis fuliflora pod extract (50% v/v) was found to induce dormancy upto 30 days with minimum germination. Foliar spraying of **Prosopis** pod extract and neem seed extract on the 80th day were effective in controlling field sprouting and *in situ* Kernal sprouting

A field trial conducted at Coimbatore in Zn deficient soil with VRI 2 groundnut to study the residual effect of Zn enriched coir pith and farm yard manure in Rice - groundnut cropping system indicated the usefulness of the application of Zn enriched organic manure compared to $ZnSO_4$ application *per se*. Application of Zn - enriched composted coir pith at 2.5 ppm at 10 t/ha to the first crop of groundnut recorded the highest pod yield (1640 kg/ha). The per cent increase over ZnSo4 application was 10.8%.

The synergistic effect of the new rhizobial strain and the standard strain TNAU 14 with *Azospirillum* and phosphobacteria were evaluated . Combination of Tt 9 with Azospirillum and phosphobacteria was found to be superior than the combination of TNAU 14 with *Azospirillum* and phosphobacteria at Coimbatore. Combined inoculation of Tt 9 with phosphobacteria at 50 per cent of recommended 'p' level recorded pod yield comparable to the yield recorded with full dose of 'p'. Hence there is a saving of 50 per cent 'p'.

Studies conducted at Virinjipuram have clearly indicated that redgram can be profitably included as a intercrop in groundnut under rain fed conditions with 200 kg/ha of gypsum applied on 25 DAS and 200 kg on 45 DAS.

Ageing groundnut kernels for 3 days (100% RH and 40°C) and subsequently testing the germination under laboratory conditions gave a near estimate of the field emergence.

The TNAU recommended package of practices with VRI 2 groundnut variety recorded an increased yield of 936 kg/ha during rabi/summer season and 430 kg/ha during kharif season over local variety and farmenr's technology at Vridhachalam.

CROP PROTECTION

Sowing of groundnut in July delayed (60 DAS) appearance of late leafspot and increased the yield to 1400 kg/ha compared to August sowing when the disease appears at 45 DAS and yield was only 915 kg/ha. Hence sowing may be taken up in July upon receipt of rains.

increase in late leafspot by one grade decreased the yield by 200 kg/ha. Therefore fungicidal spray should be given as soon as the disease reaches grade 3.0.

Seed treatement i.e. talc based P. fluorescens 4 g/kg followed by root zone application (2.5 kg + 50 kg of sand/ha) 30 and 60 DAS reduced the incidence of root rot and increased the yield.

Twenty three rust and late leafspot groundnut entries received from ICRISAT were screened and four entries viz., ICG 6284, 7888, 10052 and 10939 were found to show resistance to the above diseases. These are being utilised in the breeding programmes.

The pre-release semi-spreading groundnut culture VG 113 recorded grades of 1.8 and 1.2 of LLS and rust respectively as against 4.6 and 3.0 of these diseases recorded in TMV 10. Hence this entry may be advanced to Adaptive Research Trial.

SESAMUM

CROP IMPROVEMENT

Promising Cultures

VS 350 : It is an early maturing (70 - 75 days) and higher yielding sesame culture selected from Thirukkattupalli local. It is being evaluated in ART during kharif and rabi season.

VS 903 : This promising culture matures in 85 - 90 days in the MLT conducted during kharif'92 it has recorded a mean yield of 308 kg/ha as against 305 kg/ha of TMV 3. During rabi ' 92 - 93, it has registered a mean seed yield of 499 kg/ha (over four locations as against 402 and 491 kg/ha of TMV 3 and Co 1, respectively. Similarly during summer '93 it has recorded an average yield of 668 kg/ha (average of 7 locations) having an yield advantage of 20.7 and 14.2 % over TMV 4 and TMV 6 respectively. It is also tolerant to powdery mildew. This culture is also proposed for Adaptive Research Trial.

VS 9104 : The culture VS 9104 (85 - 90 days) is derived from the cross TMV 3 X VS 345. In the station trials conducted during the last 7 seasons, it has recorded a mean seed yield of 465 kg/ha compared to 387 kg/ha of Co 1. Hence this culture is proposed for MLT.

CROP MANAGEMENT

Split application of 50 kg of N/ha at basal and 3 weeks after sowing recorded higher seed yield of sesame (758 kg/ha) with a net return of Rs. 4158/ha and cost benefit ratio of 1.73 at Vridhachalam.

CROP PROTECTION

In gingley *Trichoderma viride* (Bio - control agent - 48 kg) and *Azospirillum* (Bio - fertilizer) were compatible for seed treatment. In combined treatment, root rot incidende was 3.8 % as against 19.5 % in control. The combined treatment increased the yield to 626 kg/ha as against 385 kg in control. The combined treatment also enhanced the *crop growth*. This indicates that both bio - control agent and bio fertilisers can be applied as a single treatment.

A vermiculite based product of *Trichoderma viride* for soil application was developed. *Trichoderma viride* (Seed treatment @ 4 g/kg + soil application of vermiculite formulation @ 125 Kg/ha) significantly reduced the root rot disease and increased the yield and oil content compared to KC1 and control treatments in gingelly. The soil application was done 90 DAS.

The intercropping studies showed that incidence of shoot and capsule borer was significantly lesser in sesame and greengram (6:1) and sesame + groundnut (4:1) when compared to sesame alone.

Correlation studies with weather factors indicated that maximum temperature was postively correlated with caspule borer while rainfall was negatively correlated with pest incidence.

SUN FLOWER

CROP IMPROVEMENT

Promising Culture

TNAU SUF 7 : An elite culture TNAU SUF 7 has been identified. (a derivative of the cross Dway x Surya). It matures in 88 days. When tested in All India Co. ordinated Trial for three years namely Kharif 90, Kharif 91 and Kharif 92, this culture gave a mean yield of 1114 Kg/ha with 32 and 16% increase in yield over Morden and EC 68414 respecively. In terms of oil yield, TNAU SUF 7 recorded mean yield of

428 Kg/ha with 39% and 14% increase over Morden and EC 68414 respectively. Inview of its superior performance over Morden, EC 68414, TNAU SUF 7 has been identified for release by the Central variety Release Committee. Thsi entry is now proposed for Adaptive Research Trial in Tamil Nadu.

TNAU SUF 10 : The promising culture recorded in mean seed yield of 1274 Kg/l.a with 50.4% increase over Morden (847 Kg/ha) and 42.9% increase in yield over EC 68414 (891 Kg/ha). In terms of oil yield also TNAU SUF 10 was the first with a mean yield of 468 Kg/ha and 67.1% and 49.5% increase over modern EC 68414 resepectively. The culture is being evaluated in ART.

TNAU SUF 11 : This promising culture recorded mean yield of 1186 kg/ha with 40% increase over Morden and 33.2% increase over EC 68416. In terms of oil yield also TNAU SUF 11 recorded 427 kg/ha with 52.5% and 36.4% increase in yield over Morden and EC 68414 resepctively.

TNAU SUF 13 : In the station trials conducted at Coimbatore during Kharif 92 and Kharif 93 TNAU SUF 13 recorded a yield of 1501 Kg/ha with 19% increase over Co2, the best check. The seed contains 36.2% of oil. In terms of oil yield TNAU SUF 13 gave 543 Kg/ha with 17.5% increase over Co2. The cuture is proposed for multilocation Trails and Co-ordinated Trial during Kharif '94.

Hybrid TNAU 9105 : Sunflower hybrid TNAU 9105 (IA X 272) has been developed. TNAU 9105 gave a mean yield of 2226 Kg/ha accounting for 30.75% increase over MSFH 17. The hybrid matures in 85 days with an oil content of 39.6%. This hybrid has been proposed to MLT and AICORO coordinated trail during Kharif '94.

CROP MANAGEMENT

The best time for the production of BSH1 Sunflower hybrid seed is May to August where perfect synchronisation occurs. A planting ratio of 1:4 (Male to Female) and an application of 90:90:40 Kg NPK/ha are optimum to get higher yield (995 Kg/ha) of good quality seeds in BSH1. Seed processing and density grading in a specific gravity grader enhances the vigour and viability of hybrid seeds. Hydration-dehydration treatment of 5 month-old seeds using disodium phosphate (10-4M) prolonged the shelf life (up to one year) and enhances the productivity.

For Coimbatore tract, a package of recommendation viz., recommended dose of NPK, 25 Kg S/ha through gypsum, overnight soaking of seeds, 0.2% borax spray to the capitulum at ray floret opening stage and hand pollination increased the yield (1312 Kg/ha) over farmers practice (895 Kg/ha) in sunflower.

At Bhavanisagar, the result of continuous application of $ZnSO_4$, $CuSO_4$ and $FeSO_4$ each at 0, 12.5 and 25 Kg/ha in sunflower-groundnut-sorghum system from 1975 to 1994 revealed that continuous application of $CuSO_4$, eventhrough, was found to be favourable for groundnut (35th and 37th crop) but it reduced the yield of sorghum at 25.0 Kg ha. continuous application of $ZnSO_4$ and $FeSO_4$ each at 12.5 Kg/ha increased the yield of sunflower (33 and 37th crop) and sorghum (35th and 38th crop). The rate of build up of available Cu in the soil is more compared to Zinc status. Continuous application of Zn, Cu and Fe did not result in increasing the available nutrients to a toxic level.

CASTOR

CROP IMPROVEMENT

Promising Cultures

Two high yielding castor cultures viz. TVC 31 and TVC 15 were in adaptive research trails. From the 1993-'94 results, TVC 31 has shown its superiority over other cultures and check varieties (TMV 2 and TMV 5) in yield. TVC 31 has recorded a mean (12 locations) yield of 825 Kg/ha under pure crop which is 21% increased yield over TMV and 18.6% over TMV 2. As an intercrop in ART, TVC 31 has recorded mean yield of (6 locations) 475 Kg/ha which is 8.3% and 69% increased yield over TMV 5 and TMV 2 respectively.

Hybrid Castor TMCH 1 : This hybrid has performed better than ruling GCH 4 hybrid in the station trails. Under irrigated condition, on an average it has recorded 1302 Kg/ha in four seasons which is 15.6 and 22.8% increased yield over GCH 4 TMV5 respectively. Under rainfed condition also TMCH 1 has registered mean yield of 975 Kg/ha which is 6.6% and 26.4% increased yield over GCH 4 and TMV 5 respectively. Hence, the castor hybrid TMCH 1 is proposed for multilocation testing (MLT) and ART simultaneously during 1994-95.

CROP MANAGEMENT

Azospirillum and phosphobacteria were tried as seed treatment (3 packets/ha) and seed plus soil application on rainfed castor crop (TMV 5) at Tindivanam from 1992. Results indicated that seed treatment with *Azospirillum* increased the yield of castor over control by 26% during 1992. When the cost benefit worked out, application of *Azospirillum* through seed gave additional increase of Rs. 834 per ha during 1992. Combined application of *Azospirillum* and *phosphobacteria* through seed and soil gave additional increase of Rs. 537/= per ha during the year 1993. Further during 1993, it was found that the treatment wherein 25% N was reduced (because of the application of *Azospirillum* through seed and soil) was on par with 100% N application so there is a possibility to reduce N by 25%.

JATROPHA

Crop Improvement

A total of 72 types of *Jatropha sp.* were collected from different places of Tamil Nadu and Port Blair. Cent per cent establishment of cuttings and seedlings was recorded in the case of *Jatrop a curoas*. But it was only 88% in *Jatropha cossypifolia*. Preliminary study on floral biology of *Jatropha* sp. was initiated.

COCONUT

Crop Improvement

Variety Released

VPM 3 : This high yielding tall variety is a selection from the materials received from CPCRI and has a duration of 80-100 years. It has a yield capacity of 92 nuts / palm / year. and 15 kg copra / palm / year. The increased nut yield of this variety accounts for 26.4 per cent higher than ECT. This variety was found to have better resilience against rainfall variations. It has high oil consent (70%). It is suitable to grow in all districts of Tamil Nadu.

Crop Management

In multistoreyed Cropping systems Banana and Pine apple combination with coconut gave a net return per unit area (Rs. 27,055/ha) followed by Banana, guava and yam in another model (Rs. 16,765/ha) over and above the sole cropping at Veppankulam. The cost benefit ratio was 1:4.2 and 1:3.2 in model I and II respectively against 1:2.6 for coconut as sole crop. In mixed cropping system the nut yield increased from 50.6 to 94.7 and 50.8 to 80.5 nuts/palm in model I and II respectively.

Crop Protection

Application of Phosphobacteria mixed in 10 Kg of farm yard manure was found to be useful for the management of the disease. Five Kg of neem cake has to be applied in the basins of the diseased tree. After one month, one packet of phosphobacteria (200 g) mixed with 10 Kg of farm yard manure has to be applied. *This may be done preferably between September and January months.* The trees should be given regular irrigation.

The biofertiliser treated palms recorded lesser disease index of 34.8 and higher nut yield of 102 when compared to control with the recorded higher disease index of 79.0 and lesser not yield of 76 per palm. The cost benefit ratio was 1:3.

Root feeding with 20 ml of neem oil + 20 ml of water + 0.5 ml of teepal per palm twice at six monthly interval was found equal in efficacy as that of the treatment with root feeding of Nuvacron 36 WSC @ 10 ml + 10 ml of water per palm against red palm weevil.

Calcium sulphate + magnesium sulphate (500 g each) along with 5 Kg of neem cake was found to give lesser disease index (27.2) as compared to 70.8 in control. The nut yield was 110 per palm per year in the treated palms as against 76 in control. A field experiment was initiated during January 1992 to study the effect of micro and secondary nutrients in the management of Thanjavur wilt.

COTTON

Crop Improvement

Promising Cultures

TKH 590 and TKH 789 : These two medium staple G. *hirsutum* cultures are being evaluated against the check variety LRA 5166 in ART in farmers' fields in 25 location spread over three districts viz. V.O. Chidambaranar, Nellai Kattabomman and Kamarajar.

TSH 188 and TSH 192

Srivilliputhur : Two cotton cultures TSH 188 and TSH 192 developed at Cotton Research Station, Srivilliputtur were found to be high yielders combined with tolerance to leaf hopper. The duration of the cultures ranges between 150 and 160 days. The seed cotton yield of TSH 188 was 1800 kg/ha and that of TSH 192 was 1531 kg/ha as compared to 1383 kg in SVPR 1. These two cultures belong to medium staple category.

Crop Management

Results of two season trials indicated that intercropping system in cotton reduced the kapas and seed yield by 50% due to reduction in plant population. The reduction was more in alternate row system than in paired-row system of intercropping. Among the comparison crops, cowpea and soybean had smoothening affect in the base crop and slightly reduced the number of sympodial branches, yield and quality of the resultant seeds. However, seed quality reduction was not evident in fresh seeds of both the base and companion crops but upon storage the seeds from the intercropping system deteriorated faster than the counter part seeds of the pure crop.

Field trials were conducted for two years at Aruppukottai under dryland conditions using acid delinted cotton seeds (var. MCU 10) hardened with 2 per cent KCL and pellctring with five different leaf powders (each separately) before rowing. The results indicated that the superiority of hardening and pelleting over control. Hardening with 2% KCL and pelleting with pungam leaf power recorded higher yield of 802.6 kg per ha.

A study conducted at Srivilliputhur on the organic farming practices with that of inorganic farming for summer irrigated cotton, INM + IPM treatment recorded the highest yield of 1275 kg/ha which is 85.5 per cent increase over control (637 kg/ha). A

high net return of Rs. 6925 per ha was received in the same treatment as compared to control (Rs. 2610 per ha). In the past incidence, the result indicated that INM + IPM treatment registered less incidence of leaf hopper 0.5 leaf hoppers/leaf as compared to control (1.3).

A study on chemical defoliants at Srivilliputhur NaCl 20% spray at 75% boll bursting stage recorded the highest seed cotton yield of 1629 kg/ha, followed by spraying drop 200 g/ha (1468 kg/ha). The control recorded a seed cotton yield of 1237 kg/ha. Hence 32.5% increased yield (402 kg/ha) was recorded over the control by spraying NaCl 20% at 75% boll bursting stage. When drop was sprayed the defoliation was complete when compared to other treatments. In the quality trails studied, there is no reduction in the quality in the treatments when compared to control.

A field trail at Kovilpatti to study the effect of seed treatment with DAP on rainfed cotton revealed that seed treatment with 2% DAP recorded highest kapas yield in both delinted (917 kg/ha) and linted (877 kg/ha) cotton besides enhancing the gross and net income in cotton. However, 3% DAP seed treatment has reduced the kapas yield in both delinted (642 kg/ha) and linted (602 kg/ha) cotton.

In the first year of study conducted at Kovilpatti on bio-mulches for rainfed cotton revealed raising sunhemp in between cotton rows and cutting after 25 DAS and spreading in between cotton rows recorded significantly higher kapas yield which was 77% higher over un-mulched plots.

Fuzzy cotton seeds coated with gum arabic became feasible for grading in a specific gravity separator. The denser seeds so separated recorded higher germination and vigour compared to lighter seeds. The seeds coated with gum arabic stored better than those coated with rich gruel and starch. Coating fuzzy seeds with cowdung slurry reduced the germination and retarded the seedling growth.

Pelleting the fuzzy seeds with 60 g DAP and 15 gm of gypsm/kg using 4% starch solution as adhesive improved the germination and seedling vigour. Pelleted seeds performed well at 60% WHC of the soil and placed at 5 cm depth. The pellet seeds can be stored up to 4 months satisfactorily under ambient conditions. Colouring fuzzy seed with composed methyl orange did not affect seed quality and storability.

Crop Protection

Based on action threshold levels and seed cotton yield, the ETL for *H.armigera* has been worked. The ETL for egg larvae and damage (%) for four insecticides based on gain threshold (GT) is as follows :

Chemical	Egg	Larva	Damage (%)
Carbaryl	0.41	0.19	2.02
Phosalone	0.67	0.31	3.25
Endosulfan	0.48	0.22	2.32
Quinalphos	0.86	0.40	4.18

Cotton intercropped with cluster beans (2:1) was found to reduce the leafhopper population and bollworm damage. The leafhopper population ranged from 2.89 to 20.44 / 5 plants when compared to 7.22 to 30.33/5 plants in the sole corp of cotton. The bollworm damage varied from 14.66 per cent to 20.94 per cent.

Chemical Spraying of Margocide 0.5% and neem oil 3% thrice at fortnightly interval were effective in reducing the leafhopper population and gave increased yield of 1334 and 1396 Kg/ha, respectively when compared to untreated check which recorded only 815 kg/ha.

Seven chemicals were tested for controlling grey mildew. Three sprays were given, one immediately after the disease appearance (90 DAS) and subsequently 2 sprays were given at 15 days interval. The maximum reduction in grey mildew disease was noticed in Haxaconasole spray (19.3 %) compared to 42% in control. The yield was increased by 26.1 per cent in Hexaconasole (1565 kg/ha).

SUGARCANE

Crop Improvement

Variety Released

COG 94077 : The clone G 85003 (derivative of Co 740 x Co 775) was found to be a promising jaggery variety. The clone G 85003 recorded significantly higher cane yield of 133.6 tonnes/ha as compared to standard CoC 771 and Co 740 which recorded 117.3 t/ha and 97.5 tonnes/ha respectively in plant crop. The increase was 37% and 81.1% in cane and jaggery yield over Co 740 and 13.9% and 26.7% over CoC 771

variety. In the ratoon crop, C 85003 recorded 19.6% increase over CoC 771 and 42.4% increase over Co 740 in cane yield. There was an increase of 91.2% over Co 740 and 32.9% over CoC 771 in jaggery yield of G 85003. In the multilocation trails conducted at 22 locations, G 85003 recorded significantly higher cane yield of 133.2 t/ha as compared to check CoC 771 and Co 740 which recorded 118.6 and 105.3 t/ha. G 85003 also recorded 14.5 tonnes of jaggery yield as compared to 11.4 and 8.8 tonnes/ha recorded by CoG 771 and Co 740. G 85003 was released as sugarcane jaggery variety CoG 94077. It is an erect, tall growing non-lodging, moderately drought tolerant variety which matures in 330 days.

Promising cultures

C88011 : This early season clone recorded higher cane yield of 131.2 t/ha as compared to the check CoC 91061 (128.4 t/ha). The CCS is 12.4 % as against 13.1 % in the check CoC 91061. However this clone possesses higher resistance to red rot diseases. It is being tested in ART.

C 88064 : In the mid late group the clone C 88064 recorded significantly higher cane yield of 124.0 t/ha as compared to 166.8 t/ha in the check Co 6304. In respect of juice quality the clone C 88064 registered significantly higher CCS of 12.9% as against 11.9% in the check of Co 6304. The new clone registered an increased sugar yield.of 15.8 % over the check Co 6304 by recording 16.0 tonnes of sugar/ha as against 13.9 t/ha in the check Co 6304.

Si 86018, 86071, 86075 : Clone Si 86018 across derivative of Cosi 776/CoC 8001, recorded 18.3 % over check in the early group. Clones CoSi 86071, 86075 (Bo 91/Q 62198) suitable for the early drought and late water logging conditions of Cauvery delta were advanced to CAE, 94 - 95.

Si 86098, 87007,87011 : In the mid/late group, Si 86098 (Bo 91/Co 62198) recorded 9.6% higher yield over the check Co 6304. Two other clones Si 87007 and Si 87011 (derivative of Co 776/Q 68 and Co 82062GC) also recorded superior yields over the check and all the above three clones were advanded to CAE.

Co 86032 : In the evolution of early clones under AICRP on sugarcane at Sugarcane Research Station, Cuddalore, the entry Co 86032 recorded higher cane and sugar yield with better juice quality than the national checks ie. Co 6907 and Co 7508. The entry will be forwarded for CAE trial after confirmative results.

CROP MANAGEMENT

Studies on the Weed Management in sugarcane intercropping system conducted at Cuddalore revealed that pre-emergence application of Thiobenacarb @ 1.25 kg ai/ha under inter cropped systems in sugarcane with soyabean, blackgram or groundnut recorded around 85.0 per cent weed control efficiency. Irrespective of herbicidal application, soyabean as intercrop has given 733.4 kg of grain yield/ha, followed by blackgram with 412.2 kg/ha and groundnut with 215.1 kg/ha. Raising of soybean, blackgram or groundnut have not affected the cane yield. Comparatively higher yield of 111.2 t/ha has been recorded by sugarcane + blackgram + Thiobencarb combination. Highest gross income of Rs. 43210 was recorded in the combination of sugarcane + blackgram applied with Thiobencarb used as herbicide. The juice quality was not influenced by intercrops and herbicides.

The study on various techniques in gap filling in ratoon sugarcane at Cuddalore, revealed that filling the gappy areas in the ratoon sugarcane crop within 30 days of harvesting the main crop with the sprouted cane stubbles take from the same field recorded full establishment. This was followed by gap filling with seedlings raised in polybags. The maximum cane yield of 113.5 t/ha was recorded in the treatment where the gappy areas were filled with sprouted stubbles taken from the same field followed by the gap filling with polybags (110 t/ha). There was no significant difference in juice quality among the different treatments. The highest sugar yield 13.0 t/ha was recorded in gap filling with sprouted stubbles closely followed by the gap filling with the polybag seedlings with 12.6 tonnes of sugar/ha. The above study indicated that gap filling in ratoon can be taken either with sprouted stubbles or polybag seedlings.

Intercropping of soybean (Co 1) in ridge side planting resulted in a yield of 770 to 970 kg/ha without any adverse effect on cane yield at Sirugamani. Soybean intercropping recorded an increased net profit of 10 to 20 per cent over sole crop of cane.

Inter cropping of daincha in ridge side planting and in corporation of the same on 60th day after planting of sugarcane recorded an increased yield of 20.25 t -1 over sole crop of cane, besides increasing the soil fertility level.

Pre - emergence application of oxadiazon @ 0.750 kg/ha was found to be economical for cane + soybean and cane + daincha intercropping. With increased weed control efficiency the yields of cane and intercrop were also increased.

Field experiments conducted at Sirugamani to fix the economical doses of fertilizers in combination with pressmud, neemcake, bio - fertilizers, Azospirillum, Phosphobacteria and micronutrients along with different doses of N revealed that 25 tons pressmud + 210 Kg N/ha + Azosprillum + Phosphobacteria + Micronutrient mixture 50 Kg/ha recorded maximum tiller production of 2.17 lakh/ha. The treatment did not influence the germination percent of both the varieties of Si 86071 and CoC 92061.

To study the influence of water management in sugarcane under moisture stress condition at Melalathur Mulching coir pith along furrows and ridges on 35th day and irrigation once in 10 days resulted into increased cane yield and sugar yield. The above treatment recorded 140.6 tonnes cane yield and 17.8 tonnes sugar yield per ha as against 125.6 tonnes cane yield and 13.8 tonnes sugar yield recorded in control plot (No mulch) irrigated once in 10 days.

Studies were undertaken in CoC 671 with cane setts and true seeds. Among the age groups, the eight month-old canes showed their superiority with regard to seed characters compared to 10 and 12 month-old canes. Total reducing sugars, amino acids, and tetrazolium test for vigour showed a decreasing trend from top to bottom portion of cane stalk. Seeds of high quality are obtained from the basal portion of inflorescence. Pyridozine treatments at 0.1% and 0.2% for sets and seeds, respectively registered high germination.

Crop Protection

From the results of the work done at Cuddalore it was found that sugarcane leafhopper, *Pyrilla perpusilla* can be effectively controlled by spraying a monocrotophas 36 WSC @ 0.072%

FORAGE CROPS

Crop Management

The seed crop of lucerne ie to be fertilized with 20:160:40 Kg NPK/ha for getting higher yield of good quality seeds. Two foliar sprays of NAA @ 200 ppm first at 50% flowering and the second at full bloom stage prevented the flower drop to the minium and resulted in higher yield of quality seeds.

Seed treatment with Azospirillum and Phosphobactrium mixture saves 25% of the recommended doses of N & P for cereal fodders (Cumbu, Maize and Sorghum) and forage grasses (Cumbu Napier Hybrid grass, Guinea grass and Deenanath).

In Deenanath grass the physiological maturity of seeds (fluffs) attained on fourth and sixth week after 50% flowering in Cv.Pusa 3 and TNDN 1, respectively associated with good germination and vigour.

DAINCHA

Crop Improvement

Promising Cultures : Two daincha cultures AS1 and AS5 possessing a biomass potential exceeding 10 t/ha and pre-flowering duration of 44 days are under multilocation test in five locations.

BREEDER SEED PRODUCTION

The breeder seed production programme has been formulated based on the consolidated indent received from the Director of Agriculture, which includes the breader seed requirement of corporate bodies and seedmen. The details of breader seed production and supply during the year 1993-94 are furnished below :

Crop	Quantity in Quintal	
	Indented	Supplied
Paddy	214.75	240.60
Millets	1.14	1.61
Cotton	0.86	0.72
Pulses	187.32	131.11
Oilseeds	1787.28	489.43
Vegetables	0.42	0.42

Centre for plant molecular biology

Anther culture was done in indica-japanics hybrids. So far 533 number of anther derived doubled haploids (true breeding) lines have been selected. These breeding lines possess dense panicles and other desired combination of traits. Based on the preliminary yield evaluation, two cultures have been identified TNAU 90012 and TNAU 90013 are in MLT.

Protoplast culture technology in rice has been applied to generate protoclone variation. The selected protoclone progenies in IR50 and Co 45 will be evaluated in next season for yield.

Micropropagation technique/protocol has been evolved for propagation of neem which is an important botanical pesticide.

Techniques for regeneration and shoot multiplication has been worked out in casuarine. DNA isolation protocol methods for restriction have been worked out.

For identification of DNA marker associated resistance gene loci for BPH resistance; mapping population (F6) involving crosses of *officinalis* derived BPH resistant lines with IR 50 and IR 36 (IR 50 x 9195 and ASD 16 x 9195) was developed and is under testing.

Mung bean storage albumin gene cloning : Towards improving the quality of rice proteins by genetic manipulation, initial attempts to isolate gene for protein rich in essential amino acids such as lysine and threonine were commenced. The isolation of gene coding for a storage albumin (Mol. Wt. 12,000 Daltons) from mung bean was targeted. Four putative positive genomic clones have been screened out of a partial genomic library constructed in Bluescript and are being studied to precisely isolate the gene encoding the storage albumin.

The protein has been purified by reversed phase - HPLC to homogeneity and used to raise antiserum to use in fishing out the genomic clones by expression screening. cDNA library has also been constructed and is being screened for the cDNA clones encoding this albumin. Once, by these approaches, the gene for mungbean albumin is available attempts will be made in the next phase to genetically introduce this gene into rice.

Processing Methods on the Preservation of Oyster Mushroom : Cultivated mushrooms are highly perishable. Due to normal senescence phenomena and/or

microbial activity mushrooms rapidly begin to darken and lose its quality. Three methods of drying viz. sundrying, thin layer drying and fluidized bed drying along with pretreatment using antimicrobial agent (Potassium meta bisulphite-KMS) were tried for preserving oyster mushroom. Dried mushrooms were stored in polythene bags for a period of three months and the change in the qualities were assessed periodically. Results showed that different drying practices did not have any effect over the biochemical constituents of mushrooms. Reduction in the protein, carbohydrate and free amino acid contents besides changes in browning index was noticed in the pretreated samples. Control showed intensified browning during drying whereas whiteness was more in treated samples. After three months storage not much variation was noticed in the carbohydrate content but a slight increase was found in the free aminoacid content and browning index.

Quality of Oils extracted from Sunflower Hybrids : Study on the effect of storage containers such as tin, aluminium, glass, stainless steel jars on the keeping quality of oils extracted form the hybrids developed at TNAU (85131, 85144, 85151) revealed that tin containers were most suitable for storage of oil even upto a period of 6 months. Oils stored in tin containers showed minimum peroxide value and free fatty acid values, whereas the oils stored in aluminium and glass containers showed maximum peroxide and free fatty acid values.

HORTICULTURE

Pomology

Banana

Crop Improvement

A high yielding variant of 'Sanna Chenkadali', diploid red banana has been identified (Code named as AA-1) as a potential clone suitable for home gardens and also for commercial cultivation. It has been tested for four years at Coimbatore Campus. The suckers have been multiplied for MLT purpose.

Crop Management

The conventional recommended spacing of 2.1 x 2.1 M recorded the desirable bunch characters viz. number of fingers/bunch, hands/bunch and weight of the bunch (36.95 t/ha). But the total yield (81.71 t/ha) was higher in closer spacing of 1.2 x 1.5 M, 1.2 x 2.0 (75.57 t/ha), 1.5 x 2.0 (71.99 t/ha) and 1.5 x 1.5 (70.04 t/ha).

But the high cost benefit ratio at 1:2.47 was observed in the spacing of 1.5 x 1.5 M, with population of 4444 plants / ha.

The variety Karpooravalli recorded the highest leaf member (13.0), leaf area (11.75 m^2)/plant relative water content (90.4%) and bunch weight (19.53 kg) when it was irrigated it 20 mm CPE, while the variety Poovan recorded high leaf (11.0) leaf area 9.63 m^2 /plant, relative water content (89.23%) and bunch weight (13.63 kg bunch) when irrigated at 60 mm CPE.

Out of 5 spacings tested, 1.5m x 1.5m spacing found to record higher yield in D.C. banana than the existing spacing of 1.8 x 1.6m in Vellore region. Under 1.5 x 1.5m spacing, 1358 plants can be additionally planted.

When the spacing was reduced to 1.5m x 1.2m and 1.2 x 1.2m, the bunch and finger weights were significantly reduced.

Glyphosate applied at 2 kg/ha, i.e. one kg at 30 days after planting and another one kg after 60 days of planting followed by earthing up on 3rd month recorded more number of hands per bunch (8.1) more fingers 12.7 t/ha hand and more weight of bunch (21 kg) resulting in more fruit yield (64.07 t/ha).

Crop Protection

In a trial to control panama disease revealed that injection of 3 ml of carbendazim 2% solution during 5th, 7th and 9th month reduced the disease incidence. Carbendazim capsuls application (60 mg/capsule) during 5th, 7th and 9th month was found to be the next best in reducing the disease incidence.

MANGO

Crop Improvement

High yielding Dwarf Rumani Selection

DPI-55 is a clonal selection for dwarf stature from Cv. Rumani from Karukkanchavadi village near Kaveripattinam. This selection is suitable for high density planting with a spacing of 5m x 5m (400 trees/ha) as against 100 trees/ha with normal Rumani. It is a regular bearer with good yield.

Crop Management

A trial was conducted to select the rootstock for large scale multiplication of commercial cultivars. Alphenso and Bangalore were used as rootstock over which the Cvs. Senthura (early), Bangalora (mid) and Neelam (late) were grafted with (i) No precuring (ii) Precuring 5 days before and (iii) precuring 10 days before.

The highest percent of success (82%) was recorded when Bangalore was grafted on its own stock with scions precured 10 days prior to grafting.

The Bangalora grafted on Alphonoso stock recorded 76% success. The scions of Bangalora recorded highest % of success (61%) irrespective of root-stock used and this is 15% and 33% higher over that of Neelam and Senthura.

SAPOTA

Crop Improvement

Variety Released

Hybrid Sapota PKM3 : Hybrid 7/1 (Guthi (PKM.1) x cricket Ball) was released as PKM.3 hybrid sapota during January, 1994. It is high yielder (14 h/ta). It bears oval shaped large fruits in cluster of 2-3. The characteristic vertical growth habit of this hybrid allows for high density planting. It is suited for growing under irrigated and rainfed conditions.

PAPAYA

Crop Improvement

New Gynodioecious papaya

A new papaya hybrid line CP.81 has been developed at Tamil Nadu Agrl. University, Coimbatore by crossing Coorg Honey D with CP.75 (Pusa Delicious x Co.3). It is a gynodicecious papaya with the horticultural traits better than Co.3. It is red fleshed with low incidence of "Stamen carpellody".

In Co.2 papaya, red flesh variants were observed at Horticultural College and Research Institute, Coimbatore. Critical studies on floral biology of many male population in Co.2 papaya led to the isolation of a male tree having distinctly reddish orange tapetal tissues in anthers while others are cream yellow. Progenies of the

cross between this male with Co.2 (Red flesh) produced 100% red fleshed female, while there was one out of 100 male trees with reddish tapetum of anthers. One of the promising F_1 progenies, code named as 9-1 (D) was compared and found superior than Co.2. Studies are under way to stabilize red colour of flesh in dioecious papaya and large scale multiplication of selected males through tissue culture, for large scale seed production.

Crop Management

For mass multiplication of papaya through shoot tip culture, the optimum size of the explant for maximum response was found to be 10 mm which produced 8.4 shoots in modified M.S. medium containing BAP at 0.5 mg/1 + NAA 0.05 ml/l.

Crop Protection

A field trial was conducted at Tamil Nadu Agrl. University, Coimbatore during monsoon season 1993 for the control of root rot and wilt. Ridomil 0.2% was the best treatment which recorded 18.9 per cent incidence followed by Bordeaux mixture one per cent which recorded 24.5% incidence as against 52.5 per cent incidence in control.

BER

Crop Improvement

Promising selections

The Cv. Kaithali had recorded the highest mean yield of 39.2 kg over a period of 7 years. It is followed by the Cv. Gola and Umran (28.5 and 28.2 kg respectively).

Crop Management

Provision of shallow basin with 5% slope around the tree trunk reduced the runoff water and helps in conservation of moisture and the yield increase was 2.71, 2.68 and 3.19% respectively over three years.

Pruning in Ber

Pruning during January and February increases the yield viz. 30 kg and 29 kg respectively. Pruning thereafter reduces the yield. Pruning during April-May recorded low yield of 15 kg and 16 kg respectively.

CUSTARD APPLE

Crop Improvement

Promising selection

The seedling selection viz., AS.1 from the collection from Courtallam area recorded the highest annual mean of 7.5 kg/tree under rainfed conditions. The mean yield of other collections range from 1.7 kg to 4.1 kg. The budded plants from AS1, are multiplied for distribution.

AMLA

Crop Improvement

Promising selection

E.O.3 : The seedling selection from Srivilliputhur namely E.O.3 recorded consistently higher yield over a period of three years with yield of 56.5, 20.8 and 75.5 kg respectively. The mean yield over the period is 60 kg per tree/year.

T6-6 Amla

At Bhavanisagar, among the 6 accessions of amla evaluated from 1979, the T6-6 recorded higher yield of 150.4 kg fruits/tree closely followed by T6-4 (143.9 kg/trees). The weight of single fruit of T6-6 was 27.3 g as against 24.5 g in T6-4.

MANDARIN ORANGE

Crop Management

Nutrition of Mandarin Orange

Experiments were conducted in private mandarin orange orchards to study the effect of K in the form of KNO3 and Ca in the form of Ca $(No3)_2$ at varying concentrations (0,0.5 and 0.75 per cent) and in combination on the yield and quality of 13 - 14 year old mandarin orange trees. The results indicated that 0.5 per cent KNO3 sprays at flowering and fruiting stages significantly increased the number of fruits (430 - 492), yield of fruits (32 - 38 kg/tree), fruit density (0.87 - 0.10) and ascorbic acid content of fruits (26.1 - 32.2 mg/100 g).

Crop Protection

Two sprays of either monocrotophos 0.036% or dichlorvos 0.1% at 14 days interval reduced the leafminer damage.

PLUM

Crop Management

In the experiment on liming and P fertilization graded levels of P (0, 150, 450 and 600 g/tree) either alone or in combination with lime (0, 75 g tree/year) in 13 year old plum Cv. Hals were studied. The results indicated that lime application at 75 g per tree/year gave 5 % increased yield over unlimed trees.

Crop Protection

Neem oil 2% caused 85% mortality of the [illegible] which was on par with neem cake extract 10 per cent. Nimbecidin 0.2 % and fish oil resin soap caused 72 and 55 per cent mortality respectively at Horticultural Research Station, Kodaikanal.

OLERICULTURE

TOMATO

Crop Improvement

Promising Selections, Coordinated Vertical testing : A total of 22 entries comprising of released varieties and cultures received from different centres were tested during 1993 - 94. Among them Co - 3 recorded the highest yield of 39.25 t/ha followed by CTRS.812 with a yield of 36.21 t/ha. The lowest yield was recorded in Phule 16 (14.63 t/ha).

Crop Management

The tomato grown in a field applied with well decomposed farm yard manure at 25 t/ha in combination with Azospirillum at 2 kg/ha, phosbobacterium at 2 kg/ha and with the released of earthworm at 200 per plot of 18 sq.m. recorded the highest mean yield of 26.18 t/ha which was on par with recommended practices of FYM + inorganic fertilizers at 120 : 100: 100 kg/ha which gave an yield of 27.80 t/ha. Regarding economics of organic gardening, the sale price of organically grown tomatoes should be increased so that the cost of other inputs like biofertilizer, earthworms, etc will be compensated.

BRINJAL

Crop Improvement

Pre - release culture

A promising white fruited selection KSM 107 performed well under ART in Tirunelveli and Chidambaranar districts during 1992 - 93.

Co -ordinated varietal testing

A total of 27 entries comprising of released varieties and cultures were tested during 1993 - 94. Among them, Pusa Purple Long recorded the highest yield of 42.37 t/ha followed by APAU with an yield of 32.98 t/ha. The entry DBSR 44 recorded the lowest yield (10.85 t/ha).

Crop Management

The trial conducted in Co 2 brinjal indicated that among the treatment combinations, 25 t FYM + 100:50:30 kg/npk/HA + Azospirillum + Phosphobacterium recorded the highest yield of 36.38 t/ha.

CHILLI

Crop Improvement

Variety Released : PLR 1 : A pureline selection CAP 8 made from Kadangadu local released as PLR 1 green chillies during January 1994. The variety recorded a mean yield of 19.34 t/ha with an increase of 18.7% and 28.5% over Co 2 and local type. In the adaptive research trials conducted at 26 locations, it gave a mean yield of 17.47 t/ha with an increase of 18.3 per cent over local. This cultures performed well in the coastal soil with high salinity with p H of 8.2 and E. C. 30dsm-1 registering 19.0 tonne/ha of green chilli.

Estimation of Oleoresin content in chilli

A total number of 16 varieties of pungent chilli were evaluated for oleoresin content. The results showed that the oleoresin contents ranged from 9.20 to 14.42 per cent. The varieties LCA 206, Co. 1 and Sel. 1 had higher content of 14.42, 14.10 and 14.00 per cent respectively.

Crop Management

The trial was laid out with the variety Co. 1 for three seasons with Biozyme crop + (2 doses) with and without normal dose of fertilizers. The results indicated that three spray application of Biozyme @ 189 ml in 180 litres of water on 35, 55 and 75 days after transplanting with normal fertilizers increased the yield of dry chilli pods to an extent of 40.6% over control with a C:B ratio of 1:2.4 as against 1:2.5 in control.

Crop Protection

Spraying neem seed kernel extract 5% inhibited the feeding of *Spodoptera litura* by 75.06 per cent and neem oil 1% caused 80 per cent mortality of aphids in the lab. studies.

Bacillus thuringiensis @ 2.5 or 3.0 lit/ha significantly reduced the fruit borer damage caused by *S. Litura* and increased the yield. The treatment was also on par with the standard treatment viz., Carbaryl 2.5 kg/ha.

ONION (Aggregatum)

Crop Improvement

Evaluation of Seed propagated aggregatum onion

Taking advantage of certain local types of onion which showed free flowering and seed setting tendency, the seed production efficiency of five such local types viz., Gnanamedu (V1), Oddanchatram (V2), Mutloor (V3), Kandakadu (V4) and Thangaithittu (V5) were studied under Coimbatore conditions.

Among the five types, Type V5 (Thangaithittu) recorded maximum plant height (44.4 cm) number of leaves (15.2), shoot girth (4.9), leaf weight (13.6 g/plant), bulb weight (10.98 g), bulb girth (8.69 cm), bulb length (4.90 cm), bulb diameter (2.90 cm) and bulb yield (88.39 G / plant). The finding suggests the possibilities of multiplying the aggregatum onion through seeds and further studies are in progress to select suitable types.

ONION (BELLARY)

Effect of spacing cum fertilizers

The results indicated that the spacing of 15 x 15 cm with 100 : 150 : 75 kg NPK/ ha is optimum for the new variety Agri found Light Red onion.

BITTERGOURD

Crop Management

A field trial was conducted in Co 1 variety with four levels of N, three levels of P and two levels of K. The results indicated that a fertilizer dose of 60 : 60 : 30 kg NPK/ ha is optimum to get higher yields.

TAPIOCA

Crop Management

Optimum fertilizer schedule for cassava var. Co. 3 is 60 : 60: 120 kg/NPK/ha which accounted for 35.8 per cent increase in yield over control.

The mean yield of two years trial revealed that the highest tuber yield was recorded in plots received with neem coated urea (33.86 t/ha) followed by sulphur coated urea (31.58 t/ha), with increases of 33.3 and 24.3 per cent respectively over absolute control.

SWEET POTATO

Crop Management

Effect of Nitrogen and Azospirillum

The mean tuber yield over three seasons have indicated that plants treated with two third of recommended dose of N (26 kg/ha) + 2 kg of Azospirillum/ha (vine dipping + 10 kg of Azospirillum per ha soil application) recorded the e highest yield of 26.86 t/ha accounting for 23.3 per cent over recommended dose of nitrogen.

FRENCH BEAN

Crop Improvement

Variety Released

YCD 1 : This is suitable for both pod and grain. It has flat, long, broad pods with attractive dark purple bold seeds. Both pods and seeds possess high nutritive value. It has field tolerance to root rot, rust, yellow mosaic and anthracnose diseases. This variety is capable of yielding 9 t of green pods /ha and 6 t of grains /ha in 105 days duration.

PEAS

Crop Management

Under the laterite soil conditions of Kodaikanal, the bio - fertilizers enhanced the available N and P. Rhizome application increased 8% yield in peas whereas phosphobacterium increased only 3%. However, the dose of 100: 100: 50 kg NPK/ ha (with seed inoculation of rhizobium) was effective in increasing the green pod yield by 16 - 18% in moringa beans.

MORINGA BEAN

Crop Improvement

Promising Selection : A pure line selection 55 selected from the germplasm recorded a yield of 7.49 tonnes of green pods/ha while the local type yielded only 5.14 t/ha with an increase of 39.2 per cent. This bean is suitable for cultivation in the hilly regions ranging from 1300 to 2400 M above MSL.

FLORICULTURE

ROSE

Crop Management

The rose rootstock trial indicated that among the three rootstocks viz., *Rosa indica* var. *odorata*, *R. multiflora* and *R. borboniana tried*, *Rosa indica* var. *odorata* recorded maximum percentage of bud take (80%). Budding during July, August and September registered maximum percentage success.

Plant Protection

Fish oil rosin soap 2.5% and endosulfan 0.07 effectively controlled both scale insect and aphids, while neem oil 3% and phosalone 0.07 % were effective against aphids.

JASMINE

Crop Management

In Jasminum grandiflorum, the treatments with N 45 g, P_2O_5 90 g and K_2O 120 g/plant (with Azospirillum and phosphobacterium) recorded higher yield / plant (1590.92 g).

CHRYSANTHEMUM

Crop Improvement

Out of the twelve chrysanthemum varieties tested under the varietal testing programme, the variety Red Gold has been selected for multilocational trial.

Crop Management

A trial was conducted to study the effect of integrated nutrient management in chrysanthemum Cv. Co. 1. The treatment N 90, P_2O_5 94 and K_2O 25 kg/ha along with Azospirillum and phosphobacterium @ 20 kg/ha recorded highest number of flowers, (2139) and flower weight (6363 g) per plot of 3 X 3 m size.

Betelvine
Sirugamani
(SGM.) 1

French Bean
Yercaud
(YCD.) 1

GLADIOLUS

Crop Improvement

Promising cultures

A total of 78 accessions of gladioli were assembled and studied for their suitability to Kodaikanal conditions. From the population of American beauty, a selection namely GS 5 - 12 has been made which was later released as a variety (KKL - 1) for hilly regions of Tamil Nadu. The flowers of this selection are attractive red - purple with white flushed throat.

CAMELLIA

Crop Management

Propagation studies in Camella indicated that single node cuttings under mist registered the highest per centage of rooting (92%) followed by cuttings with two nodes (90%).

SPICES, PLANTATION CROPS, MEDICINAL AND AROMATIC PLANTS

TURMERIC

Crop Improvement

Variety Released

BSR 2 : It is a medium statured short duration variety (240 - 250 days) with a yield potential of 32696 kg/ha. It has field resistance to scale insect. Suitable for growing in the May - June season. This is a mutant from Erode local type.

PEPPER

Crop Management

A field study on fertilizer requirement indicated that application of 150, 50, 150 and 25 g of N, P_2O_5, K_2O and $MgSO_4$ per vine recorded the maximum yield of 7.10 kg of dry pepper and was found to be significantly superior.

GARLIC

Crop Management

In Ooty - 1 variety, application of N, P and K @ 125 : 90 : 125 kg/ha registered the highest bulb yield of 26 t/ha. Application of NPK at this level did not cause any rubbering and sprouting in garlic.

CASHEW

Crop Management

The foliar nutrition of urea at 4% concentration sprayed along with endosulfan, in addition to the soil application of recommended dose of fertilizers registered the highest yield of 6.35 kg of nuts per tree compared to 3.98 kg in the treatment with application of fertilizers through soil alone.

MEDICINAL AND AROMATIC PLANTS

SENNA

Crop Improvement

Among 12 cultures screened for their yield under dryland conditions, the local type therkolan (K.S.12) recorded the highest leaf yield consistently (686.7 g/20 sq.m.)

GYMNEMA

Crop Improvement

Twelve ecotypes of Gymnema were collected from various parts of Tamil Nadu and Kerala and are being evaluated.

BETELVINE

Crop Improvement

Variety Released

SGM 1: It is a high yielding (109.54 lakh leave/ha) dwarf statured vine with vigorous bushy growth. This variety has thick hairy stem with short internodes and multilaterals. The leaves possess attractive yellowish green colour with desirable pungency. It is a pure line selection from Palghat type having a duration of 2 - 21/2 years. It is suitable in January - March and June - August season in all betelvine growing areas of Tamil nadu.

Crop Management

Effect of Neem coated Urea

Neem coated urea @ 100 kg/ha recorded the highest vine elongation (35.6 cm), laterals per plant (10), leaf yield (37.08 / ha), 100 leaf weight (191.69) and keeping quality (16.3 days) and least per cent disease incidence (12.9).

HOME SCIENCE

Changes in the trace minerals profile of rice after cooking in different metal utensil was studied at Madurai. The rice was cooked by the boiling and absorption method in different utensils viz., stainless steel; aluminium and hindalium. The trace minerals like Fe, Al, Cr, Ni, Cu, Zn and Pb were analysed before and after cooking the rice. On cooking in different utensils the trace minerals values were increased significantly in all the rice samples. Large increase in Fe values were observed in the rice samples cooked in low quality stainless steel vessel (8.42 mg) and in low quality aluminium vessels (8.30 mg). The maximum mean Al values were registered when the rice samples were prepared in aluminium vessels of low and medium quality (25.38 mg) followed by Indalium low quality vessel (24.00 mg). Rice cooked in stainless

steel vessels showed higher Cr and Ni content than in the other vessels and the values ranged from 1.52 to 2.76 and from 2.06 to 3.10 mg/100 g respectively. It was also observed that the low quality stainless steel vessel leached the maximum quantum of Cu, Zn and Pb when rice was cooked in it.

Preparation of sago vadagams using soya was taken up at Madurai. Traditional foods like appalam and vadagam from very important adjuncts to our south Indian meals. Vadagams are generally prepared with rice or sago along with spices. In this study soya flour has been introduced in sago vadagam in order to increase its nutrient quality. The preparation involves the following steps; Pressure cooked sago soaked overnight for 15 min, defatted soyaflour mixed in little water and added to cooked sago, added cumin seeds and salt, boiled for 5 min, cooled and poured over damp cloth to sundry for 3 to 4 days, removed from cloth and again sun dried for 1 day and packed in polythene bags for storage.

This product was found to be very acceptable upto 30% soya flour incorporation. It had a pale yellow colour when large globules of sago were used. Its taste and flavour was judged to be good. On frying it had good puffing characteristics. On storing in polythene bags the vadagams retained its good quality even after 9 months. Every 100 g of this product contain 14.8% protein and can supply 320 calories. This can be recommended as special nutritious supplement for children. Soya consumption can also be thus popularised.

Studies on simple on-farm techniques for the accelerated ageing of freshly harvested rice were taken up at Madurai. Freshly harvested IR 20 and ADT 36 rice varieties were placed in tins (16 Kgs). The tins were costed with black board paint on the outside and on the lids to enhance their heat absorption. Water (50 ml) was placed in closed cups provided with perforated lids on the surface of the rice. The tins were placed directly under the sun from 8.00 AM to 5.00 PM. The experimental set up provided moist heat which resulted in the accelerated ageing of rice in ten days (Normally it will take atleast 3 to 4 months for natural ageing). In this simple on farm technique, the cooking parameters and organoleptic properties improved to a very great extent and the rice was better than the naturally aged (90 days) rice. There was no insect attack or off-flavour development during storage in the accelerated aged rice, because of keeping them in closed moist atmosphere for 10 days under the sun.

Studies on the stability of B-carotene and ascorbic acid during processing and storage of some south Indian vegetable dishes were undertaken at Madurai. *Sambars, Porials* and *Kootus* were prepared using six different vegetables by three different

cooking methods (open, pressure and microwave cooking) and the loss of B-carotene and ascorbic acid were assessed both due to preparation and due to storage. *Sambars* were found to results in more loss of B-carotene (3.13 to 34.63%) whereas, preparation of *Kootu* resulted in higher losses of ascorbic acid (20.92 to 67.29%). The loss of ascorbic acid was higher than that of B-carotene in all the recipes. During storage, there was a progressive loss of both the vitamins and significant loss occurred after storage for 6 hr at room temperature.

Studies on the processing of dehydrated food product from coconut were taken up at Madurai. Coconut could be used for preparing dehydrated product by employing the following steps like dehusking, deshelling, removing tests, cutting into pieces, blanching in boiling water for 10 min, cooking in sugar syrup (35° bx) until the syrup reached 75° bx or soaking in syrup (20° bx) and drying (60°C for 6 hr). The coconut kernel from which the top layer was peeled produced good quality product with respect to colour. The dried product contained 8.38 g% moisture. It had an acceptability score after 60 days of storage at room temperature in 100 guage polythene bags. From the dehydrated coconut product, products like coconut crisp and cocount pulse, flour mix were developed and the organoleptic tests revealed acceptability score of the respondents.

FORESTRY

The influence of agro-ecozones on oil content in the neem of Tamil Nadu was studied with thirty three pheno - typically superior trees from six different agroecozones and were assessed for their oil content. It ranged from 35.5 to 43.1 % on Kernel basis. The highest mean oil content was recorded by high rainfall zone with a value of 40.04% followed by north - western zone 39.8%, southern zone 39.62%. Western zone 38.41% and north - eastern zone 38.93%. The least mean value of 38.08% was recorded in the Cauvery delta zone. On an individual tree basis the highest oil content of 43.58% was recorded from Alangulam area of southern zone, followed by Erode with 43.0% and Panruti of north eastern zone with 42.2%.

Effect of different soil types on azadirachtin and mineral constituents of kernel in neem was studied utilising five soil types viz. black, red, alluvial, coastal alluvium and lateritic soils. Azadirachtin content was the highest in 3.72 g/kg in red soil followed by black 3.08 g/kg and least 2.71 in lateritic soils. While K and Ca did not vary due to soil types Mg was distinctly superior in alluvial soil. However, on individual location basis, seeds collected from Bannari (Periyar) recorded a high Azadirachtin content of 10.0 g/kg followed by Tiruppathur (N. Arcot) with 8.10 g/kg.

Studies on the effect of five different soil types on the oil content and seed mineral constituents in pungam on the oil content and seed mineral constituents in pungam revealed that trees growing on coastal alluvium were characterised by maximum oil content of 37.5 per cent. Considering mineral constituents, lateritic soil proved promising.

Effect of seed size on viability and storability in pungam was studied by collecting kernels from 15 year old wood lot at Tirupur were resolved into three size classes of small, medium and large and evaluated for viability, vigour and storability. Large sized seeds had not only higher germinability (51%) but also the highest vigour index. On storage, however both small and large seeds showed a decline in germination at the end of 3 months; but in medium sized seeds it was at the end of 2 months itself.

Studies on seed fortification were taken up in *Acacia nilotice* which is characterized by seed - coat dormancy and was fortified with different chemicals including cowdung slurry as a treatment. Though several treatments enhanced both viability and vigour, distinctly superior results were obtained only with 2% KNO_3 recording 86 per cent germination as compared to water soaking 56 per cent.

Six tree species viz. *C. equisitifolia, A.lebback, Azadirachta indica, A. nilotica, D. sissco* and *A. mellifera* were evaluated for their tolerance to alkaline soils (pH 9.14; ESP : 30). Relative to normal soil, growth under alkali soils was depressed in all species but the magnitude of reduction was the least in neem. Incorporation of amendment viz., pressmud @ 5 g/plant proved promising for *Casuarina equisetifolia, Acacia indica* and *Acacia nilotica*. For *Dalbergia sissco*, gypsum @ 0.5 kg/plant enhanced in growth height. For *Albizia lebback* and *Acacia mellifera* none of the soil amendments were efficacious.

Ten tree species viz, *A.leucophloea, A.nilotica, Alibisia lebback*, Neem, Casuarina, *Eucalyptus Calandulemis, E.tereticornis, Hardwickia binata* and *Prosopis* were evaluated for their effects on soil physicochemical properties related to a barren soil. Water holding capacity and Porosity increased under all the tree species. Organic carbon increased under *Cauarina equisetifolia, Hardwickia binata* and *Eucalyptus tereticornis*. Avaialble N did so under *C.equisetifolia* and *A.nilotica*. From a holistic standpoint, *C.equisetifolia* is considered to be a desirable species in maximising soil fertility.

Economic appraisal of different land use systems viz., Agriculture (turmeric, cotton), silviculture (teak, kapok) and agrisilviculture (teak + turmeric + kapok + cotton) was conducted and the results indicated that considering a/c ratio, agriculture proved

to be the least remunerative and silviculture the most remunerative. From the standpoint the NPV which is a better yardstick for evaluating the worthiness of system, agrisilviculture had a definite edge over pure silviculture.

The returns from a few tree species under both rainfed *(Acacia nilotica, Albizia lebback, Proposis and Ceiba pentandra)* and irrigated *(Eucalyptus tereticornis Casuarina, Tectona grandis and Ceiba pentandra)* conditions were evaluated for economic appraisal of a few multipurpose trees. Under rainfed condition *Prosopis juliflora* recorded the highest NPV while it was teak under irrigated conditions.

Performance of Australian acacias on lateritic soil of Pudukkottai tract was undertaken and among *(Acacia salicina* 16648*)* did not establish . Of the rest, A. crassicarpa (13681) recorded the highest volume of 0.057 cu.m per tree, *A. holoserica* (Brooma) recorded a volume of only 0.022 cu.m. However, *A. holosericea* recorded higher survival of 76 per cent as against 40 per cent (13681). Four other provenances of *A. grassificarpa* did not perform well

AGRICULTURAL ENGINEERING

The following three gadgets/equipments were released during January, 1994 for the benefit of the farming community.

1. Spray boom for Orchard and field crops

A new spray boom attachable with a rocker or foot sprayer has been developed in the Regional Research Station, Paiyur. It has only a weight of 3 kg and can be used easily on tree crops and field crops. Spraying can be done both on upper surface and lower surface on the leaves with a droplet size of 50 microns uniformly. It costs only Rs. 125 and by using these 40 per cent of the time and 50 per cent of the spray fluid can be saved.

2. Cleaner cum grader for pulses and ragi

A manually operated rotary cleaner-cum-grader for pulses and ragi has been devised in the Regional Research Station, Paiyur. Produce from threshing floor can be cleaned and graded at a cost of Rs.2 per quintal easily. It can clean and grade 225 kgs of green gram or blackgram or ragi per hour. The unit costs Rs. 2500/-.

3. **Bush clearing machine**

A machine for clearing bushy plants like parthenium has been developed at Zonal Research Centre, Coimbatore. It is powered by a 5.4 HP diesel engine and can be operated easily by a single person. This machine can clear bushes in 4 ha per day at a cost of Rs.140/ha. This machine including engine costs Rs. 27000/-

Chisel plough: A low drought chisel plough has been developed and tested for performance. It is suitable for moisture conservation in rainfed agriculture. It is also used to break the hard pan and to increase the water intake. The salient findings are given below:

Field capacity	:	0.40 ha
Depth of operation	:	35-40 cm
Width of furrow loosened	:	30-35 cm
Moisture saved due to use of chisel plough	:	12-13% over control
Cost of the unit	:	Rs.4,000

Pregerminated paddy seeder : The pregerminated paddy seeder has cylindrical drums to sow the seeds in eight rows. The seed rate can be varied by moving the rings provided on the drums. Each drum has two rows of openings having different diameters at 20 cm spacing. The unit weighs 15 kg without seeds.

The paddy seeder was evaluated for performance in the wetlands and Paddy Breeding Station of Coimbatore campus. The salient findings are given below:

- The paddy seeder facilitates line sowing of pregerminated seeds in low lands.
- Since the crop is row-planted, the intercultural operations become easier.
- The effective field capacity of the machine is 0.9 ha/day.
- The cost of the unit is Rs.1,000/-
- Cost of operation is Rs. 270/- ha compared to Rs.1,600/ha in the manual method of line planting.

Alternate material for rubber rolls in a paddy sheller: The thermoplastic polyurethane Elastaners (TPU) has been identified as an alternate material for rubber rolls in a paddy sheller. The hardness is 96 share 'A' (hardness of rubber : 87 share

'A'). **The shelling efficiency was 90 per cent as against 85 per cent in rubber roll sheller and the breakage percentage was same in both the cases.**

Pepper thresher : A power operated pepper thrasher was developed and tested. The threshing efficiency was 85% at the optimum clearance of 6 mm. The capacity of the machine was 50 kg/ha and the cost of operation worksout to Rs. 50/- per quintal. The cost of the unit is Rs.10,000/- including 1 HP electric motor.

Lye-peeling of cassava: A chemical method for peeling of cassava & tubers, using sodium hydroxide solution was developed. The optimum parameters are :-

i) Concentration of solution	:	8 - 10%
ii) Temperature of solution	:	55-95°C
iii) Dipping time	:	4 to 7 minutes
iv) Peeling efficiency	:	98-100%

Tall trees sprayer for areca and coconut : A sprayer suitable for spraying liquid chemical for tall trees has been developed. The maximum height reach in 17 meters. It is portable and can be moved easily in the field. The cost of the unit is Rs.7,000/-

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES

Study on the constraints to higher rice yields in different rice production environments and prioritization of rice research in Southern India was carried out at Coimbatore. The study covers the whole of Southern India. One hundred and twenty rice scientists and an equal number of extension personnel in all Agricultural University campuses and Regional Rice Research Stations in Southern India were interviewed for the above study. The yield gap was assessed.

Yield gap I arises due to differences in environment which cannot be managed in the farmer's field.

Yield gap II is the primary concern of the present study because it is the difference between actual farm yield and yield attained in On-farm experiments.

The yield gap II arises due to pests, diseases, soil and water, physiological, agronomic, genetic and socioeconomic constraints.

The important constraints in Andhra Pradesh are leaf folder, ear head bug, yellow stem borer, lodging, rice blast, weeds, brown plant hopper, salinity, water management and gall midge.

The important constraints in Karnataka are : Rice blast, yellow stem borer, leaf folder, imbalance use of fertilizer, varietal problems, ear head bug, weeds, water management, Zn deficiency and brown plant hopper.

The important constraints in Kerala are : Leaf folder, yellow stem borer, ear head bug, rice blast, gall midge, sheath blight, varietal problems, lodging water management and salinity.

The important constraints in Tamil Nadu are : Leaf folder, ear head bug, imbalanced use of fertilizer, rice blast, water management, yellow stem borer, gall midge, weeds, low fertility and lodging.

A study on the causes for fall in prices in Agricultural commodities was conducted in all the 60 clusters spread over the entire Tamil Nadu selected under the cost of cultivation scheme. The study showed that there was no fall in the price of paddy received by the farmers during 1992 - 93 as compared to 1991 - 92. The price received was Rs.357.47/qtl in 1992 - 93 as against Rs. 312.88/qtl in 1991 - 92. But the farmers expressed that the price received was not to their expectation, since there was an increase in the fertilizer price, particularly phosphatic and potash.

In groundnut, there was fall in the price received by the farmers in Dharmapuri district. The price received was Rs.518.27/qtl in 1992 - 93 as against 591.67/qtl in 1991 - 92. Due to the drought prevailed during 1992 - 93, the quality was severely affected resulting in lower price.

As regards cotton, during 1992 - 93 the price declined as compared to 1991 - 92. The price received was Rs. 939.09/qtl in 1992 - 93 as against Rs. 1135.89/qtl in 1991 - 92. This was due to comfortable stock position and bright prospects of cotton production in 1992 - 93 season.

As regards blackgram, there was a fall in price in Thanjavur district. The farmers received Rs.738.75/qtl in 1992 - 93 as compared to Rs.738.61/qtl in 1991 - 92. This was due to the fact that production of blackgram was more as the crop was raised in Samba follows. The area under samba fallow crop was more as compared to 1991 - 92.

In other crops the prices were in an increasing trend. However, due to the steep increase in fertilizer prices, they are not remunerative.

A study on the participation of rural women in development activities was conducted in Madurai East, Periyakulam and Thirumangalam blocks (representing wet, garden and dryland tracts of the district) with a sample of thousand five hundred rural women. The study showed that 33% of the rural women were employed, 55% were available for work; while 12% were not available for work. Old age, disability, need to care infants and elders in the family were the major reasons reported for remaining unemployed. Among the women eligible for work, 57% remained voluntarily unemployed due to household chores, personal unwillingness and not desired by the family, 12% remained unemployed due to perception of field problems as workers and as women and 32% remained unemployed, as they did not get work at the desired wage rate or at any wage rate.

A study on the techno-economic feasibility of soybean cultivation on a large scale in Madurai district was, conducted in Andipatti, Vadipatti, Madurai North and Madurai South showed that the mean area of sample farms was 1.5 ha and 80% of sample farmers raised soyabean as a pure crop. The cost and returns were worked out for soybean and its competing crops groundnut, gingelly and blackgram. The cost of cultivation for groundnut per ha was the highest when compared to other crops and it was least for blackgram. Net income per ha for soybean was Rs.5911 and it was higher than all its competing crops viz. groundnut Rs.5066, gingelly Rs.2733 and blackgram Rs.3099. Intercropping of soyabean with sugarcane was most profitable (Rs.5675/ha) than blackgram as intercrop (Rs.2209)

A study on the economics of production and marketing of cotton in Rajapalayam and Virudunagar taluks of Kamarajar district indicated that the 36% of the gross cropped area of the farms was raised under cotton. The yield of irrigated cotton ranged from 12 to 13 q and that of rainfed crop was 7.5 q/ha. The cost of cultivation (variable cost) or irrigated cotton was Rs.6324 per ha and that of rainfed cotton was Rs.4359 per ha. The corresponding fixed cost amounted to Rs.1753 and Rs.840 per ha respectively. The net income per ha was Rs.9575 and Rs.4190 respectively for the irrigated and rainfed cotton, while the corresponding per quintal cost of production was Rs.619 and Rs.653 respectively. Bullock labour, machine labour, potash and plant protection chemicals were found to be under utilised, indicating the scope for increasing the output of cotton by using more of these inputs. Nearly 77% of the farmers were found to store 67% of the marketed surplus and the storage loss was estimated as 2.2% of the marketed surplus. Only 19% of the marketed surplus was

stored beyond 120 days. Nearly 73% of the farmers marketed their kapas through village merchants which formed 76% of the marketed surplus. While 20% of the farmers sold their produce through commission agents which formed 16% of the marketed surplus. Only 7% of the farmers sold through regulated markets and the kapas formed 16% of the marketed surplus.

Economic viability of farm machanisation and its impact on employment of farm labour were studied. Farm machanisation improved intensity of crop production and diversification of cropping pattern.

It increased the employment of permanent and casual labour and saved family labour, but total employment of human labour increased.

On average, a farm owning tractor used it for 779.17 hours in a year. On-farm use accounted for 26.39 per cent and while custom hiring provided the major share of tractor use. The break-even point for efficient use of tractor was 925.16 hours per year. Hence, there was need to find more use for tractor. However, net return per rupee of cost, was more than Rs.1.88 for different levels of mechanisation and the benefit/cost ratio (3.92:1) showed that investment in farm mechanisation was economically viable.

A study on strategies to increase farm profit was takenup in Theni block of Madurai district. The cost and returns of major crops raised in the block showed that the per ha cost of cultivation was the highest for banana (Rs.38015) followed by sugarcane (Rs.20388), brinjal (Rs.14786) and chillies (Rs.11706). The net income per ha was the highest for banana (Rs.42527), followed by sugarcane (Rs.20232), cotton II season (Rs.18260), cotton I season (Rs.17740) and tomato (Rs.16501). The net income was the least for rainfed gingelly (Rs.1661).

A linear programming analysis of a typical farm (2.4 ha) showed that inclusion of banana along with paddy would increase the net farm income to Rs.73,000 which was higher than the existing income by 114.18 per cent. Considering the risk in raising of banana and cotton crops, the analysis indicated potentials for increasing the net income of the farm by 26.66 per cent, by altering the existing crop mix.

A study on the media usage and training needs of extension personnel in media management was taken up among sixty four extension personnel in the cadres of Assistant Agricultural Officers from Uthamapalayam and Karaikudi divisions of Madurai District. The study indicated the following:

Nearly two thirds (61 %) of the extension personnel were regular listeners to radio programme and 81% of them transferred the Agricultural information received from radio to farmers. Less than fifty per cent (42%) were frequent viewers of T&V Programmes and most of them never participated in any of the Doordharsan Programme. Nearly three-fourths of the extension personnel were found to have transferred Agricultural news from print media to the farming community. Off-campus training on media management was mostly preferred by the extension personnel. Collection, selection and arrangement of messages for various media was the most preferred area for training as felt by majority of the extension workers.

A system approach on Oilseed Technology Generation, transfer and consequential effect on growers was carried out in South Arcot district. The results indicated an effective transfer on technology from the research and extension systems to the client system. The perception of farm scientists on their linkage with and feedback received from the groundnut growers was found to be at less than the expected level. Moreover, more than half of them expressed no linkage with scientist of other research organisations. Enough staff to carry out effective coordinated research, a journal exclusively for publishing oilseed research and regular inservice training etc., were the expectations of the farm scientists in developing and spreading groundnut technologies in the state. The extension personnel perception on their linkage with other systems are feed back from the farmerwise at an expected level. Generating low cost technologies, reducing the area of operation of extension personnel and need - based timely training etc., were the expectations of the extension personnel in developing and spreading groundnut technologies in the state. Majority of the big and small farmers in both irrigated and rainfed conditions had been possessing medium level of knowledge and adoption. In general, both in irrigated and rainfed conditions education was the only variable showing maximum direct effect. A bunch type groundnut variety which is tolerant to drought during pegging to maturity phase and low - cost Groundnut seed drill and stripper were the most important technological needs of the groundnut growers. After adoption of improved groundnut varieties and technologies, increase in groundnut yield was to the tune of 66 and 57 per cent among irrigated and rainfed Groundnut growers respectively.

WATER TECHNOLOGY CENTRE

A study conducted on the improved water management practice in rice under well irrigation indicated that irrigation to 5.0 cm depth, one day after disappearance was found to be effective in maximising the use of irrigation water resulting in a saving of 35.4 per cent besides increasing the rice yield to about 15.0 per cent.

In a study carried out to find out the bio - efficacy and continuous application of herbicides under submerged conditions in rice - rice - pulse cropping systems, the results indicated that in ADT 36 and IR 20 varieties, irrigation in the day of disappearance of ponded water (I_1) registered higher grain yield (5012 kg & 5337 kg/ ha) as compared to other two irrigation levels. Irrigation at 3 days after the day of disappearance of ponded water registered a net saving of 15 - 17 per cent in total water requirement over I_1. With regard to water use efficiency also I_2 was comparable with I_3 irrigation at 6 days after disappearance (5.41 and 5.59 respectively).

Hence under scarcity conditions of water supply, irrigation upto 5 cm depth 3 days after disappearance of ponded water is an efficient economical water management practices as good as irrigation on the day of disappearance of ponded water in rice based cropping system of alfisols of Tambiarparani command area.

The results of trials conducted (OFT) at Salem, Periyar and Vellore blocks with a treatment of Kaivarappu at a height of 29 cm all round the field bund inside the plot leaving a spacing of 30 cm between the main bund indicated that the water used under control plots (without provision of kaivarappu) was higher in all the three locations recording 162.0, 165.0 and 152.5 cm as against 123.5, 124.0 and 115.0 cm of water treatment plots resulted in a water saving of 23.8, 24.8 and 24.6 per cent in the above blocks respectively.

In the study of productivity per unit of water under various land use mixes, it was evident that well irrigation recorded the maximum out put per unit quantity of water due to effective utilisation of water. Higher productivity and profit per unit of water was observed in Periyar district than Salem. In general performance of tank system was comparatively poor than well irrigation and canal system. Canal system was closely followed by well irrigation. Among different canal systems, Lower Bhavani (Arachalur) recorded the maximum product and profit per unit quantity of water and required minimum water to produce unit quantity of product.

Application of coir waste at 10 t/ha as mulch resulted in saving of about 16 percent water with a yield increase of 14 per cent.

TNAU

The improved water management practice of applying 5.0 cm of water irrigation through ridges and furrows recorded a saving of 24 per cent water with a yield increase of 9.4 per cent in Co 2 groundnut.

Application of 0.5% KCl recorded the highest grain yield of 1150 kg/ha in soybean. Besides the boron or aluminium at 0.3% during water stress conditions alleviates the ill effects of drought by recording 1080 and 1080 kg/ha respectively as compared to control 990 kg/ha.

Among the methods of irrigation ridges and furrows at 0.8 among the methods at 0.8 IW/CPE ratio was found to better than flat bed, along with application of composted coir waste at 12.5 t/ha.

The on-farm trial was conducted at Puduchatram village in Puduchatram block of Salem district on paired row furrow irrigation on water economy in cotton (LRA 5166) under well irrigation in addition to the farmers' method of irrigating under normal ridges and furrows. The results showed that the paired row furrow method of irrigation saved 28 per cent water without any loss in seed cotton yield. The water use efficiency was higher under paired row furrow irrigation method.

The on-farm trial conducted at South Bothanam village of Udumalpet block on improved water management practice was conducted and the following conclusions were drawn.

a) The depth of 5.0 cm water under all furrow and alternative furrow saved 34.9 percent and 57.1 per cent respectively when compared to farmers' practice.

b) The cane yield was 117.0 t/ha under all furrow irrigation, 105.0 t/ha under alternate furrow and 115.0 t/ha under control indicating that application of higher depth of water per irrigation did not influence the cane yield.

c) Irrigation to 5.0 cm depth, through normal ridges and furrow method recorded higher yield, with a water saving upto 34.90 percent, compared to control.

d) Irrigation to 5.0 cm depth through alternate furrow irrigation registered lower cane yield (105 t/ha) accounting to about 10 % yield reduction compared to 5.0 cm depth of water through all furrow method.

The experiment (OFT) was conducted under well irrigation at Kurumpapalayam village of Perur taluk, with 5.0 cm depth of irrigation water to all furrows and alternate furrow irrigation coupled with the use of composted coir pith at 10 t/ha in variety Co3.

The results revealed that there was a saving of water to the tune of 42% under all furrow and 59.8 % under alternate furrow with composted coir pith compared to control. The highest yield of 2463 kg/ha under all furrow irrigation followed by control (2387) and alternate furrow was found to record the least (2185 kg/ha).

The seepage losses in the Lower Bhavani Project Channel systems were assessed. The seepage losses in main canal varied from 17.1% to 9.3% from head to tail, in distributories the losses varied from 13.7% to 16.3% from head to tail and in field channels the seepage losses varied from 9.6% to 13.8% from head to tail reaches.

The result of the experiment conducted at Bhavanisagar during 1993 with 6 different irrigation regimes and four different levels of N in banana in red non calcareous soil revealed that the highest fruit yield of 22.3 t/ha was recorded under irrigation at 1.0 IW/CPE ratio from 0-7 months and 1.20 IW/CPE ratio from 7-14 months with gradual widening of furrow. With regard to N, 150% of recommended dose gave higher fruit yield (22.7 t/ha) and it was comparable with 125% of N (21.2 t/ha).

5. EXTENSION EDUCATION

The Directorate of Extension Education and the various extension education centres of TNAU are engaged in the transfer of technology emerging from the research programmes of the University. The details regarding the extension education activities of the Directorate of Extension Education are furnished in this chapter.

Krishi Vigyan Kendras

The four Krishi Vigyan Kendras at Coimbatore, Madurai, Trichy and Vridhachalam conducted on-campus and off-campus training programmes on agriculture and allied activities. About 414 training programmes were conducted and the beneficiaries included 7733 farmers, 3560 farm women, 1368 extension workers, 75 youths and 331 other categories of personnel. In addition these centres carried out 178 method demonstrations, 57 group/village meetings, 24 farm/field days, 5 farmers' days, 526 farm advisory services and answered 3192 farmers' queries. Besides these, 60 articles were published in dailies and farm magazines, 99 radio and TV programmes/ announcements were broadcast/telecast for the benefit of farming community. For reference, 139 Extension Literature/Publications were brought out. Slide shows numbering 42 were screened and 32 exhibitions and 42 campaigns were organised as part of their mass media utilisation activity.

Plant Clinic Centres

The scientists of the five plant clinic centres at Vrinjipuram, Salem, Tirur, Killikulam and Srivilliputhur periodically visited the farmers' holdings, identified pests and diseases problems and suggested suitable remedial measures. These clinics also organised programmes for on-farm testing of pre-release cultures of various crops, management practices and plant protection methods besides undertaking surveillance work for the purpose of forecasting the outbreak of pests and diseases. Evolving prediction formulae for important pests and diseases and conducting case studies were the other activities of the plant clinic centres. The Plant Clinic Centres carried out 54 trainings on integrated pest management and the beneficiaries were 1270 farmers, 84 farm women and 946 extension workers. Besides individual and group contacts, 29 skill demonstrations, 83 group/village meetings, 18 farm/field days and 3 farmers' days were conducted. These centres also organised 503 farm advisory services, answered 212 farm queries, published 50 articles in dailies and farm

magazines, broadcast/telecast 58 programmes, released 15 publications and organised 11 slide/film shows, 4 exhibitions and 8 campaigns.

Communication Centre

The Communication Centre at Tamil Nadu Agricultural University main campus, Coimbatore disseminated the innovations of the University by various methods. They are in the form of answering 3560 farmers' queries, writing 70 articles in dailies/farm magazines, 4 radio programmes, 56 TV programmes, 35 slide film shows and 3 exhibitions. Nearly 2800 people visited the central museum and central exhibition and they were benefited. The communication centre also conducted distant learning programmes like farm school on All India Radio and correspondence courses.

Distant Learning Programmes

1. Farm School on All India Radio

During the period under report courses on agriculture and its allied activities, kitchen gardening, new approaches in edible mushroom cultivation, agro based industries, commercial flower cultivation and coconut cultivation were held. Nearly 307 registered farmers and thousands of other farmers were benefited. One day contact programme was conducted for the courses to give practical training on subjects concerned by organising skill demonstration, exhibition, group discussion etc.

2. Correspondence Courses

Correspondence courses on grape cultivation and flower cultivation were organised from April to June 1993, Growth regulation and micronutrients were organised from July to September 1993, Fruit and ornamental plant production methods and ornamental gardening and lawn making from October to December 1993 and from January to March 1994 Fruit and vegetable preservation and Dryland orchards were conducted. Nearly 689 farmers were enrolled and they were benefited. The registered participants were given certificates during the three day contact programmes.

Cassette lessons

Audio cassette lessons on Dry farming techniques were prepared during the period under report. Sixty eight recorded cassettes on coconut cultivation, tapioca, paddy sericulture, fruits (part I, II & III), forage crops, turmeric, mushroom, cardamom, pepper and sugarcane cultivation were distributed to the farming community.

Video Production Unit

The Video Production Unit involved in the production of video programmes on agriculture and allied activities in addition to the programmes for telecast through Doordarshan Kendra, Madras. During the period under report 88 programmes were covered. About 157 video lessons were duplicated and sold. Fiftaen video shows were arranged. Further, video coverage was arranged during the important functions of the University.

Training Unit

The training unit of the Directorate of Extension Education conducted 66 training programmes benefiting 1281 participants. The participants were extension personnel from State Department of Agriculture, NDDB, Sericulture, bank officials, administrators, defence personnel, scientist of TNAU and housewives.

Periodicals

1. TNAU Newsletter

This is a monthly journal published by the Directorate of Extension Education. Through this the latest research findings and various extension activities were highlighted regularly and sent to all the Agricultural Universities, selected research organisations, development departments and scientists in India and abroad. At present 350 copies are printed and distributed.

2. Valarum Velanmai

This is a Tamil monthly journal of the Directorate of Extension Education having 10000 subscribers. Efforts are taken to increase the circulation of Valarum Velanmai by enrolling some more life subscribers. Special issues on pulses, cotton, vegetable and water management were brought out.

3. TNAU Seithi Madal

This is a Tamil Monthly Newsletter disseminating the technologies in agriculture and allied subjects relevant to the season, variety and crops among the farming community and other officials of the development departments of the State. This Seithi Madal also carries important aspects such as seasonal and location specific recommendations, new findings, forecasting of pests and diseases, climatic changes and their impact etc. and functions as an effective tool in the transfer of technology.

At present 1700 copies are printed and distributed to the Convenors of the Farmers Discussion Groups of Krishi Vigyan Kendras, Farmers' Training Centres and officials of the development departments of the State.

Agricultural Information Service

The regular flow of information is ensured to the extension workers and farmers through the Agricultural Information Service which is functioning at the main campus. On all Wednesdays timely and need based messages were processed with the help of scientists and disseminated through all mass media. Besides this, this centre also issues daily press notes highlighting the ongoing activities of the University. During the period under report 6500 visitors received information from Agricultural Information Service. Every Wednesday has been identified as the contact day for farmers. Proper/ regular counseling was given to the farmers with the held of Heads of Departments and the Directors.

The message processed and sent to various media during the period under report are as follows:

Departments

1.	Agronomy	55
2.	Soil Science	16
3.	Agrl. Entomology	10
4.	Plant Pathology	2
5.	School of Genetics	22
6.	Nematology	5
7.	Seed Technology	40
8.	Forage Crops	2
9.	Agrl. Economics	8
10.	Sericulture	2
11.	Agrl. Processing	2
12.	Oil Seed	3
13.	Horticulture	1
14.	Agrl. Extension	1
15.	Micro Biology	1
16.	Water Technology	2
	Total	170

Other activities

Press Notes	180
Engagement Column	244
Farmers' queries (in person) answered	3410
Wednesday meetings	48
Replies sent to farmers queries	110

First Line Demonstration

The First line demonstrations on oil seeds and pulses were started in 1990-91 with the grant of ICAR, New Delhi. The objective of the scheme is to establish the potential of improved technology in increasing the productivity of oilseeds and pulses through profitable input management, timely operation, reducing harvesting and post harvesting losses and human drudgery in agricultural operation. The demonstration will be carried out for a period of two years with the same farmers. The demonstrations were organised for the oilseed crops like groundnut, sesamum, sunflower and soybean and pulses like greengram and blackgram in a block of 5 ha area.

Table I Number of Trainings conducted

Sl. No.	Centre	No. of of training	Beneficiaries (Number)				
			Farmers	Farm	Extn.	Youths	Others
1.	KVK, Coimbatore	102	2566	1098	90	75	3
2.	KVK, Madurai	81	1538	410	185	–	–
3.	KVK, Trichy	101	1666	717	1006	–	–
4.	KVK, Vridhachalam	130	1963	1335	93	–	328
5.	PCC, Vrinjipuram	6	100	–	25	–	–
6.	PCC, Salem	9	135	–	100	–	–
7.	PCC, Tirur	14	364	20	232	–	–
8.	PCC, Killikulam	29	571	64	539	–	–
9.	PCC, Srivilliputhur	6	100	–	56	–	–

Table II Individual / Group Contact

S. No.	Centre	Method Demonstrations	Village Meetings	Farm/ field days	Farmers Day	Farm Advisory services	Queries answered
1.	KVK, Coimbatore	42	25	5	1	25	312
2.	KVK, Madurai	14	13	7	2	102	143
3.	KVK, Trichy	26	17	6	1	162	66
4.	KVK, Vridhachalam	96	2	6	1	237	2671
5.	PCC, Vrinjipuram	5	21	–	2	63	5
6.	PCC, Salem	4	3	4	–	48	36
7.	PCC, Tirur	3	8	4	–	116	50
8.	PCC, Killikulam	–	28	–	1	141	60
9.	PCC, Srivilliputhur	17	23	10	–	135	61

Table III Mass Media Utilisation Programme

Sl. No.	Centre	Writing to Dailies & Farm Magazines	Radio/TV Progra-mmes	Publi-cations brought out	Slide/ film shows	Exhibitions	Campaign/ Seminars
1.	KVK, Coimbatore	13	35	9	20	9	18
2.	KVK, Madurai	17	28	102	3	7	8
3.	KVK, Trichy	15	24	15	10	7	7
4.	KVK, Vridhachalam	15	12	13	29	9	9
5.	PCC, Vrinjipuram	4	10	1	–	–	–
6.	PCC, Salem	12	11	2	–	–	4
7.	PCC, Tirur	5	16	2	1	1	1
8.	PCC, Killikulam	17	10	8	10	3	3
9.	PCC, Srivilliputhur	12	11	2	–	–	–

APPENDIX I

IMPORTANT CIVIL WORKS COMPLETED

1993 - 94

1. Water supply arrangements, Ambasamudram
2. Cycle shed, Ambasamudram
3. Irrigation facilities, Ambasamudram
4. Drying yard cum shed, Bhavanisagar
5. Net house, Coimbatore
6. Pollination chamber, Coimbatore
7. Drying yard, Killikulam
8. Seed processing shed, Killikulam
9. Temporary shed, Killikulam
10. Cycle shed, Killikulam
11. Drain for hostel block mess, Killikulam
12. Road to hostel block, Killikulam
13. Road in New Area, Killikulam
14. Chain link fencing, Kodaikanal
15. Foot path, Kodaikanal
16. Staff Quarters, Kumulur
17. Students hostel, Kumulur
18. Multipurpose building, Kumulur
19. Basket Ball Court, Kumulur

20. Barbed wire fencing, Kumulur

21. Threshing floor, Kumulur

22. Drying yard, Kumulur

23. Library building, Madurai

24. First floor over stack room, Madurai

25. Desilting Chittankulam tank, Madurai

26. Kitchen cum Dining Hall, Madurai

27. Barbed wire fencing, Melalathur

28. Vehicle shed, Mettupalayam

29. First floor over NARP Laboratory, Periyakulam

30. Farmers' hostel, Periyakulam

31. Cycle shed, Periyakulam

32. Refreshment hall, Periyakulam

33. Field laboratory, Periyakulam

34. Students' field laboratory, Periyakulam

35. Ground level water tank, Periyakulam

36. Threshing floor, Periyakulam

37. Screen house, Palur

38. Barbed wire fencing, Sirugamani

39. Threshing floor, Sirugamani

40. Barbed wire fencing, Thadiyankudisai

41. Contour stone wall, Thadiyankudisai

42. T & V shed, Tirur

43. Conference hall, Tirur

44. Screen house, Tirur

45. Lab-cum-office building, Tirur

46. Hostel for farm women trainees, Trichy
47. Teachers Hostel, Trichy
48. Barbed wire fencing, Vijayanagaram
49. Retaining wall and road, Vijayanagaram
50. Barbed wire fencing, Vridhachalam
51. Seed processing shed, Vridhachalam
52. Drying yard, Vridhachalam
53. Vechile shed, Vridhachalam

APPENDIX - II

LIST OF SCHEMES

University Research Schemes - Plan

		1993-94 Revised Estimate (Rs. in Lakhs)
1.	Scheme for starting post-graduate diploma in Plant Protection, Coimbatore	3.97
2.	Scheme for the establishment of an advance centre for soil and crop management studies, Coimbatore	2.41
3.	Scheme for strengthening of training division in the Directorate of Extension Education, Coimbatore	1.05
4.	Scheme for strengthening of Estate Office, Coimbatore	3.09
5.	Scheme for starting of M.E.(Ag) in Post-harvest Technology, Coimbatore	0.20
6.	Scheme for strengthening of Radiation Research, Coimbatore	2.02
7	Scheme for strengthening the Directorate of Research, Coimbatore	4.07
8.	Micro-propagation of horticultural crops, Coimbatore	0.85
9.	Development of suitable strains of Azospirillum for commercial crops, Coimbatore	1.31
10.	PG. Education and training programme leading to M.Sc degree in Bio Technology, CPMB	5.50
11.	Exploitation of hybrid vigour and development of superior hybrids in redgram, Coimbatore	1.28
12.	Biological control of soil borne plant pathogens, Coimbatore	0.84
13.	Studies on the role of VA-Mycorrhizal fungus in the establishment of P-Nutrition of Agricultural and Plantation Crops, Coimbatore	0.30

14.	Establishment of Video-Library, Coimbatore	1.21
15.	Water Technology Centre, Coimbatore	18.10
16.	Starting of post-graduate programme leading to M.B.M., Coimbatore	3.36
17.	Mitochondrial DNA and proteins in cytoplasmic male steriles in Sorghum, Coimbatore	0.87
18.	Development of monoclonal antibodies for RTV in rice and CMV and BTV in banana, Coimbatore	1.48
19.	Scheme for the establishment of a Centre for Sericulture, Coimbatore	3.60
20.	Scheme for strengthening post-graduate teaching and research in agricultural marketing management, Coimbatore	1.97
21.	Scheme for establishment of an Advance Centre for Studies on Plant Protection, Coimbatore	3.44
22.	Management of virus diseases of horticultural crops, Coimbatore	1.14
23.	Remote Sensing Unit-Agricultural Applications, Coimbatore	4.19
24.	Faculty of Forestry, Coimbatore	5.86
25.	Strengthening foliar diagnosis research to alleviate nutritional and physiological disorders in crop plants, Periyakulam	1.80
26.	Studies on the improvement and management of sweet oranges, Periyakulam	0.80
27.	Studies on the decline in the yield of grape, banana, tomato and brinjal due to nematode and fungus complex, Periyakulam	2.54
28.	Horticultural College and Research Institute, Periyakulam	.
29.	Agricultural College and Research Institute, Kumulur	64.05
30.	Survey and management of pests of forests and forage trees, Mettupalayam	0.96
31.	Tissue culture technique for forest trees, Mettupalayam	1.55

32.	Isolation and popularisation of superior genotypes of match wood trees, Mettupalayam	
33.	Forest College and Research Institute, Mettupalayam	0.50
34.	Agricultural College and Research Institute, Killikulam	1.89
35.	Research on dry land horticultural crops in red soil tract, Killikulam	1.89
36.	Establishment of Seed Technology Unit, Killikulam	2.75
37.	Scheme for strengthening and coordinating rice virus disease and mycoplasma diseases, Madurai	2.33
38.	Scheme for development of Seed Technology Unit, Madurai	2.45
39.	Establishment of Centre for Nematode Pests of Crop Plants, Madurai	1.89
40.	Studies on processing technology for soya based foods, Madurai	1.01
41.	Teaching science and technology to farm women through video cassettes, Madurai	1.10
42.	Scheme for strengthening and coordinating rice entomological research, Madurai	3.30
43.	Scheme for strengthening of research on chemistry of submerged soils, Aduthurai	1.04
44.	Scheme for the production of breeder seed in paddy, Aduthurai	3.12
45.	Scheme for commercial exploitation of heterosis in rice, Aduthurai	1.09
46.	Evaluation of scented and non-scented rices, Aduthurai	0.84
47.	Scheme for the establishment of Regional Research Station, Aruppukottai	9.48
48.	Scheme for upgradation of Tamil Nadu Rice Research Institute and Reorganisation of the set up of Directorate of Research, Aduthurai	3.01
49.	Studies on seed crop management practices under dryland conditions, Aruppukottai	0.73
50.	Scheme for breeder seed increase, Bhavanisagar	4.64

51.	Establishment of a seed complex including seed health testing and training, Bhavanisagar, Mettupalayam	2.26
52.	Scheme for upgrading the Sugarcane Research Station, Cuddalore	4.46
53.	Technology development of wasteland reclamation in coastal area, Cuddalore	3.18
54.	Evolving new varieties and technology for higher productivity in Casuarina, Cuddalore	1.55
55.	Establishment of laboratory for survey and research on Golden Nematodes of Potatoes, Vijayanagaram, Uthagamandalam	3.30
56.	Scheme for investigation on the management of pests and diseases of hill fruit and vegetable crops of the Nilgiris, Uthagamandalam	2.04
57.	Studies on drought climatology, Trichirapalli	0.79
58.	Sub-project for strengthening the Horticultural Reseach Station, Thadiyankudisai	7.87
59.	Scheme for improvement of groundnut suitable for rainfed areas, Tindivanam	1.21
60.	Operational research on pests and diseases management in rice, Kattuthottam, Thanjavur	1.59
61.	Bio-fertilizer research on forest system in Western Ghats, Kodaikanal	0.94
62.	Scheme for development of breeder seeds in millets, Kovilpatti	2.36
63.	Scheme for vegetable seed production, Palur	2.33
64.	Scheme for improvement of brinjal varieties for North and Western Regions of Tamil Nadu, Palur	1.23
65.	Scheme for the improvement of chillies in southern districts of Tamil Nadu, Paramakudi	2.99
66.	Mass production and quality control of bio-fertilizers, Palyur	0.63
67.	Scheme for formulation of improved agro-techniques in grapes suitable for Dharmapuri, Palyur	1.39

68.	Sub-project for strengthening the Regional Research Station, Paiyur	7.54
69.	Scheme for strengthening of seed production programme, Pattukottai	0.75
70.	NARP Sub-project at Thirupathisaram	1.65
71.	Banana Research Station, Virinjipuram, Vellore	5.24
72.	Scheme for the establishment of Agricultural Research Station, Vellore	4.28
73.	Development of sorghum varieties for various industrial purposes, Vellore	1.59
74.	Causes of button shedding nut strinking and ill filling in coconut, Veppankulam	0.92
75.	Scheme for strengthening of coconut research in Thanjavur district, Veppankulam	3.09
76.	National Pulses Research Centre, Vamban	5.48
77.	Scheme for breeder seed production in groundnut, Vamban	1.63
78.	Scheme for strengthening Plant Clinic Centres at Vellore, Tirur, Killikulam, Srivilliputhur and Salem	8.58
79.	Scheme for research on improvement of cultivation of Palmyrah Palm, Srivilliputhur and Killikulam	4.31
80.	Scheme for research on intensification of medium staple cotton, Srivilliputhur, Kovilpatti and Aduthurai	4.52
81.	Scheme for research on introduction of new tree species, Coimbatore, Mettupalayam, Vamban and Killikulam	2.11
82.	Scheme for popularisation of agricultural implements through Krishi Vigyan Kendras, Coimbatore and Madurai	1.84
83.	Scheme for improvement of forage grasses and legumes and pasture development, Aruppukottai and Paiyur	2.67
84.	Scheme for seed production and seed storage studies on sub-tropical and temperate crops, Periyakulam (Kodaikanal and Thadiyankudisai sub-centres)	1.74

85.	Scheme for strengthening of breeder seed programme at Vridhachalam, Tindivanam and Kattupakkam	7.09
86.	Scheme for multiplication and distribution of pulses, Vamban, Tindivanam, Coimbatore	7.79
87.	National Agricultural Research Project, Cauvery Delta Zone, Aduthurai and Trichirapalli	11.26
88.	Sub-project for strengthening Regional Research Station, Vridhachalam, Cuddalore, Tindivanam and Kattupakkam	7.00
89.	Sub-project for strengthening Regional Research Station, Aruppukottai, Srivilliputhur and Pudukottai (Vamban)	17.42
90.	Scheme for Establishment of Regional Laboratory at Trichirapalli, Paiyur and Yercaud	6.59
91.	Krishi Vigyan Kendras, Coimbatore and Madurai	12.86
92.	Scheme for starting bio-fertilizer production and quality control unit, Coimbatore and Madurai	2.68
93.	Scheme for the development of sugarcane at Madurai (Sirugamani) and Melalathur	1.62
94.	Development of extra rice variety, Aduthurai	0.63
95.	Evolving chilli varieties resistant to mosaic and thrips, Killikulam	0.70
96.	Programming for diversified production activities for dryland and wasteland, Pudukottai (Vamban)	0.70
97.	Strengthening of the department of bio-energy, Coimbatore	3.13
98.	Molecular diagnosis kit for early detection of bunchytop of banana, Thadiyankudisai	1.25
99.	Evaluation of greengram and redgram genotypes for table purpose, Vamban	0.50
100.	Setting up a pilot plant for fruits and vegetable based processing industry, Periyakulam	1.80

101.	Management practices for bamboo under irrigated conditions, Mettupalayam	0.65
102.	Tree improvement in exotic species for wood based industries, Mettupalayam	1.60
103.	Rice technology development, management and utilisation - A farming system approach, Aduthurai	2.20
104.	Developement of varieties resistant to rice blast, sheath rot and ragi blast using tissue culture, Coimbatore	1.51
105.	Development of pheromones for major pests of rice and cotton, Coimbatore	1.20
106.	Season specific seed production technology for the development of seed districts in generating quality seed for yield maximisation, Aduthurai	1.60
107.	Scheme for exploitation of male sterile lines for developing hybrid cotton, Coimbatore	0.48
108.	Agro-forestry system for sloppy lands, Uthagamandalam	0.75
109.	On-farm trials on improved technologies developed for crops grown in Salem and Dharmapuri districts, Salem	2.20
110.	Variety Release Award	1.00
111.	Creation of an Endowment Planning, development and evaluation cell, Coimbatore	
112.	Development of wastelands of Pasumpon Muthuramalingam and Ramanathapuram Districts through Crop Husbandry, Agro Forestry and Horticultural Crops, Ramanathapuram	4.09
113.	Identification of efficient strains of micro organisms and development of processes for bio conversion of farm wastes, and urban wastes, Cuddalore	1.20
114.	Physiological studies on salt tolerance and development of rice varieties tolerant to coastal and inland salinity at RRS, Tirur	2.01

115.	Scheme on Strengthening Research on Medicinal and Herbal Plant in the Plains (Killikulam) and Hills (Yercaud)	2.70
116.	Setting of agro based industry for processing vegetables, jack, sugarcane and coconut, Horticultural College and Research Institute, Periyakulam	2.00
117.	Pollution due to Tannery, Cement factory, Paper Industry and Sugar factory and development of technology to over come the problems, AC & RI, Killikulam	2.74
118.	Scheme for maximising yield of rainfed crops in red soils of Dharmapuri district at Regional Research Station, Paiyur	1.00
119.	Scheme for delineation of pollutants in Uyyakondan River and identification of crop varieties and technologies to over come the problem in Tiruchi, Tiruchi	1.85
120.	Standardisation of vegetative propagation techniques in tree species at ARS, Thadiyankudisai	
121.	Advanced centre for Training in Water Management, Coimbatore	3.96
122.	Development of hybrid sesamum for irrigated uplands, RRS, Vridhachalam	1.08
123.	Scheme for development of rice fallow pulses for Nellai Kattabomman and Chidambaranar Districts, RRS, Ambasamudram	0.70
124.	Development of maize varieties for industrial purpose, Agrl. Research Station, Bhavanisagar	1.16
125.	Development of Management practices for high productivity in oil palm (*Elaein guineensis*), Sugarcane Research Station, Sirugamani	2.87
126.	Source - sink relationship for improving productivity in Tapioca, Vegetable Research Station, Palur	0.89
127.	Establishment of a model mechanised rice based farm in Cauvery Delta, Tamil nadu Rice Res. Institute, Aduthurai	2.78
128.	Management of Pomegranate fruit borer, CPPS, Coimbatore	0.46

129.	Management of Phytonematodes through bio-control and cultural practices in turmeric Agrl. Research Station, Bhavanisagar	0.96
130.	Scheme for research on Arid Zone Fruit crops, Kumulur	1.83
131.	Crop improvement in some bulbous ornamentals and standardisation of their cultural requirement for cut-flower production Horticultural Research Station, Kodaikanal	1.83
132.	Scheme for research on Orchids and Anthuriums for export trade, varietal development, propagation management and commercialisation Horticultural Research Station, Yercaud	1.28
133.	Study on the salt encrustation problems in conveyance pipes and measures to tackle them, Water Technology Centre, Coimbatore	0.74
134.	Studies on processing and packaging of mushrooms, Coimbatore	3.07
135.	An assessment of Potential for expanding production, processing and export of horticultural commodities - Coimbatore	0.77
136.	Study of potential and application of plasticulture in Agricultural production, Coimbatore	4.58
137.	Shifting of Engineering College - Establishment of the Departments viz. Farm Machinery, Soil and Water Conservation, Agricultural structure and Bio Energy, Kumulur	10.00

Non Plan Schemes

1.	Scheme for improvement of sunflower in Tamil Nadu, Kovilpatti	2.85
2.	Scheme for coordinated agronomic experiments on sugarcane, Cuddalore	4.98
3.	Scheme for research on nematode parasites of sugarcane crop, Cuddalore	
4.	Scheme for biological testing of pesticides laboratory, Vamban, Kovilpatti, Aduthurai and Tindivanam	6.10
5.	Scheme for improvement of groundnut through induction of mutation, Coimbatore	1.28
6.	Scheme for studies on the residues of pesticides in plant and soil, Coimbatore	3.31
7.	Scheme for research on citrus-dieback, Killikulam and Coimbatore	1.53
8.	Scheme for improvement of redgram and soybean, Vamban	2.85
9.	Scheme for evolution of cumbu resistant to grean ear and ergot diseases, Vamban, Kovilpatti	4.06
10.	Scheme for intensification of pulses research, Vamban	1.44
11.	Scheme for maximisation of pulses production, Vamban	
12.	Scheme for improvement of millets for grain and fodder, Kovilpatti	2.64
13.	Scheme for improvement of wetland pulses, Aduthurai	3.62
14.	Scheme for Coordinated Agronomic Experiments on Sugarcane, Sirugamani	5.30
15.	Agrl. Research Station, Ramanathapuram	
16.	Scheme for surveillance of pests and diseases, Vellore	2.93

ICAR Coordinated Research Scheme (Partly financed)

1.	All India Coordinated Research Project on Agronomic Research, Coimbatore, Tanjore, Ramanathapuram, Vellore	11.48
2.	All India Coordinated Research Project on Water Management, Bhavanisagar, Madurai	13.04
3.	All India Coordinated Research Project on Dryland Agriculture, Kovilpatti	5.55
4.	All India Coordinated Research Project on under utilised/under exploited plants, Mettupalayam	2.21
5.	All India Coordinated Research Project on Sugarcane, Cuddalore	0.84
6.	All India Coordinated Research Project on improvement of soil physical conditions to increase agricultural production of problematic areas, Coimbatore	3.51
7.	All India Coordinated Research Project on micro and secondary nutrient and pollutant elements in soil and plants, Coimbatore	3.89
8.	All India Coordinated Research Project on longterm fertilizer experiment, Coimbatore	1.07
9.	All India Coordinated Research Project on Agro-Meteorology, Kovilpatti	1.74
10.	All India Coordinated Research Project on investigation of correlation of soil test with crop response, Coimbatore	3.24
11.	All India Coordinated Research Project on Oilseeds, Coimbatore, Vridhachalam, Tindivanam and Bhavanisagar	17.51
12.	All India Coordinated Research Project on Jute and Allied Fibres, Aduthurai	1.39
13.	All India Coordinated Research Project on Rice Improvement, Coimbatore, Aduthurai and Madurai	10.44
14.	All India Coordinated Research Project on Sorghum, Coimbatore	6.60
15.	All India Coordinated Research Project on Forage crops, Coimbatore	5.23

16.	All India Coordinated Research Project on Cotton, Coimbatore, Kovilpatti and Srivilliputhur	12.93
17.	All India Coordinated Research Project on Intensification of Research on the Improvement of Pulses, Coimbatore, Vamban	11.86
18.	All India Coordinated Research Project on Palm, Aliyarnagar, Aduthurai	4.08
19.	All India Coordinated Research Project on Maize, Coimbatore	1.92
20.	All India Coordinated Research Project on Small Millets, Coimbatore	4.79
21.	All India Coordinated Research Project on Acarology, Coimbatore	1.34
22.	All India Coordinated Research Project on Pesticides, Coimbatore	3.19
23.	All India Coordinated Research Project on Plant parasitic nematodes with integrated approach for their control, Coimbatore	2.54
24.	All India Coordinated Research Project on biological control of crop pests and weeds, Coimbatore	1.59
25.	All India Coordinated Research Project on Seed borne diseases, Coimbatore	1.19
26.	All India Coordinated Research Project on Mushrooms, Coimbatore	2.16
27.	All India Coordinated Research Project on Betelvine wilt disease, Sirugamani	2.09
28.	All India Coordinated Research Project on Weed control, Coimbatore	3.61
29.	All India Coordinated Research Project on Spices and Plantation Crops, Coimbatore, Yercaud	4.56
30.	All India Coordinated Research Project on Palm (Coconut), Veppankulam	5.74
31.	All India Coordinated Research Project on Vegetables including chillies, Coimbatore	3.51
32.	All India Coordinated Research Project on Cashew, Vridhachalam	2.78
33.	All India Coordinated Research Project on post-harvest technology in horticultural crops, Periyakulam	3.41

34.	All India Coordinated Research Project on Floriculture, Coimbatore	2.30
35.	All India Coordinated Research Project on Tuber Crops other than potatoes, Coimbatore	2.73
36.	All India Coordinated Research Project on Tropical fruits, Periyakulam, Coimbatore	8.91
37.	All India Coordinated Research Project on arid fruits, Aruppukottai	2.80
38.	All India Coordinated Research Project on renewable energy sources, Coimbatore	8.67
39.	All India Coordinated Research Project on farm implements and machinery, Coimbatore	13.96
40.	All India Coordinated Research Project on energy requirement in agricultural sector, Coimbatore	6.07
41.	All India Coordinated Research Project on intensive testing of power tiller and research and development of new machine to make them versatile, Coimbatore	2.81
42.	All India Coordinated Research Project on post harvest technology, Coimbatore	4.48
43.	All India Coordinated Research Project on biological nitrogen fixation, Coimbatore	2.04
44.	All India Coordinated Research Project on Agro-forestry, Mettupalayam	2.34
45.	All India Coordinated Research Project on Soybean, Coimbatore	1.33
46.	All India Coordinated Research Projects on Sub Trôpical Fruits (Mango), Periakulam	12.50
47.	All India Coordinated Research Projects on Cotton - vaigai centre at Periakulam	30.41
48.	All India Coordinated Research Projects on Pearl Millets, Coimbatore	
49.	All India Coordinated Research Projects on groundnut - verification centre at Tindivanam, Vridhachalam, Aliyarnagar, Bhavanisagar	63.14

ICAR - Fully Financed Schemes

1.	All India Coordinated Research Project on National Demonstration on major food crops, Salem	1.54
2.	Krishi Vigyan Kendra, Vridhachalam and Trichi	23.30
3.	Project for breeder seeds of Annual Oil seeds Crops, Bhavanisagar and Vridhachalam	9.18
4.	Adaptive Research on Sugarcane, Cuddalore	11.48
5.	Frontline Demonstration in oilseeds, Coimbatore, Bhavanisatar, Aliyarnagar, Vridhachalam and Tindivanam	
6.	Scheme for the promotion of research and development efforts on hybrids in selected crops, Coimbatore, Bhavanisagar and Tinidvanam	31.00
7.	First line demonstration on oil seeds crops (Kharif, summer and Rabi) through Krishi Vigyan Kendras at Coimbatore, Madurai, Tiruchirapalli, Kattupakkam and Vridhachalam	6.00
8.	Scheme for production of breeder seeds of annual Kharif/Rabi oil seeds crops, Bhavanisagar and Vridhachalam	0.83
9.	Studies on seed collection, processing and standardisation of storage practicesin sylvicultural crops of economic importance, Mettupalayam	1.14
10.	First line demonstration on pulses, Rabi/Summer crop-Blackgram and Greengram, Vamban and Thanjavur	1.14
11.	Front line demonstration on oil seeds component D-Demonstrations on efficiency of Rhizobium inoculation on oilseeds under the All India coordinated Research Project on BNF, Coimbatore	0.31
12.	Front line demonstrations on oilseeds, sub-component D-Demonstration of improved package of practises for oil seeds with emphasis on balanced fertilisation through soil testing, Coimbatore	0.18

13.	Scheme for multilocation trial in sunflower (oilseeds), Coimbatore	0.05
14.	Front line demonstration for oilseeds, sunflower hybrids, Bhavanisagar	
15.	Scheme for demonstration and populatisation of imporved implements and machinary through Krishi Vigyan Kendra, Coimbatore	3.01
16.	Front line demonstrations on production potentials of oil seeds Crops-Soyabean, Coimbatore	0.82
17.	Front line demonstrations on oilseeds, sub-component D demonstrations of inter-cropping/sequence cropping systems involving oilseed crops under rainfed conditions, Kovilpatti	0.24
18.	Front line demonstration on oilseeds sub-component cropping systems research demonstration on production potential at ECF Centres, Vellore and Ramanathapuram	
20.	Front line demonstration in sunflower (oilseeds), Coimbatore	0.36
21.	Stand Alone Fuel Cell Power Plants for Rural Electrification in India, College of Agrl. Engineering, Coimbatore	0.18
22.	Front line demonstrations on pulses under National Pulses Development Project (NPDP), Coimbatore and Vamban	0.84
23.	Studies on genetic manipulation of algal symbiont *Anabaena azollae* and induction of sporulation process in Azolla	2.26
24.	Devlopment of osmoregulatory and salt resistant strains in Azosprrillum for use in problem soils at AC and RI, Madurai	2.01
25.	VA - Micorrhizae as a dynamic microsymbiont in association with horticultural crops at Horticultural Research Station, Yércaud and Regional Research Station, Paiyur	0.44
26.	Use of biotechnology for disease management in rice, Coimbatore	0.54
27.	Exploiting the genetic potential of the Rhizobium nodulation *Sesbania rostrata* and *Aescaynomena indica*, Coimbatore	
28.	Genetic improvement of Rhizobium Sp (Cowpea spp). Coimbatore	0.93
29.	Creation of revolving fund for production of breeder seed of oilseeds, Vridhachalam	1.00

30.	Strengthening research capabilities for varietial improvement, testing and un-interrupted basic and breeder seed production	26.42
31.	Demonstration studies on *Gymnema sylvestre* Schult, Coimbatore	2.50
32.	Utilization of Frankia and its symbiosis with Alnus for Nilgiris, Uthagamandalam	0.63
33.	Oilseed production programme - Augumentation of irrigation facilities for breeder seed production of groundnut, RRS, Vridhachalam and CRS, Tindivanam	1.00
34.	NARP - ICAR - Strengthening of research capabilities - Basic research - Sub project on resource characterisation of rain fed farming system in peninsular India, ARS Kovilpatti	26.42
35.	Augumentation of Irrigation facilities for Breeder seed production, Tinidvanam, Vridhachalam	4.50
36.	Methane emission in rice based cropping system, Aduthurai	5.82
37.	Ecology of Termites associated & enacroles and generation of green houses grases, Coimbatore	5.11
38.	Screening of Gossypium spp. to Reniform nematode & interaction with Fungi, Coimbatore	3.51
39.	Soil Microbiological studies in High value Horticultureal crops, Coimbatore	3.89
40.	Evaluation of rice germplasm for Biotic stresses, Aduthurai	2.26
41.	Scheme for improvement of curry leaf, Coimbatore	4.39
42.	Front line demonstration of improved Agrl. Mach. for major pulses crops, Coimbatore	9.10
43.	AICRP on Groundnut - verification centre for peresud/mastard, Coimbatore, Vridhachalam	15000 / centre per year
44.	Improvement of Papaya through In-vitro cultures, Coimbatore	9.46
45.	Creation of variation for improvement of yield of coriander through mutuation Breeding	3.86

NARP Phase II Sub- Projects

I.	North Eastern Zone	
	1. Vellore	61.58
II.	North Western Zone	
	2. Paiyur	19.38
III.	Cauvery Delta Zone	
	3. Aduthurai	22.13
	4. Trichy	2.48
	5. Kattuthottam	25.68
	6. Sirugamani	36.20
IV.	Western Zone	
	7. Bhavanisagar	24.64
	8. Mettupalayam	55.35
V.	Southern Zone	
	9. Periyakulam	45.32
	10. Aruppukotai	19.50
	11. Pudukkottai	18.96
	12. Srivilliputhur	7.90
	13. Killikulam	7.94
VI.	Hilly and Tribal Zone	
	14. Yercaud	43.42
	15. Vijayanagaram	23.02
VII.	High Rainfall Zone	
	16. Pechiparai	66.74
	17. Thirupathisaram	21.21

Government of India Schemes

1.	Regional biogas training and development centre, Coimbatore	6.42
2.	Scheme for establishment of regional centre for fuel efficient stove technology (Technical backup support unit of National Programme on improved Chulas), Coimbatore	3.30
3.	Test kit for fermentative and methnogenic anaerobes, Coimbatore	1.42
4.	Microbiology of methane production from cattle dung, human waste, piggery waste and sago industry effluent, Coimbatore	3.37
5.	Degradation of fatty acids by syntrophic coculture in biogas digestors, Coimbatore	5.47
6.	Scheme for characterisation of transclucent prefab dome of fixed dome biogas plants in relation to selective electro - magnetic wave length filtering and resulting response microbes in general and methanogens in particular, Coimbatore	3.00
7.	Establishment of user centre at Tamil Nadu Agricultural University, Coimbatore under Bio-technology information System (BTIS) A national infrastructural facility, Bio-technology Unit, Coimbatore	11.34
8.	Biological control of insects pests through bio-technology, coimbatore	4.39
9.	Biological control of root rot diseaces of pulses and oil seeds and mass multiplication of antagonists, Coimbatore	2.75
10	Establishment of pilot plats for mass production of Trichogramma and Chrisopa and field studies with genetically improved strains, Coimbatore	4.20
11.	Establishment of Centre for Plant Molecular Biology (CPMB), Coimbatore	41.57
12.	Scheme on the technology development and demonstration project on bio - fertilizers (BGA), blue green algae, Aduthurai	17.26
13.	Selection and cloning of hyper ligninolytic streptomyces sp. for conversion of lignin rich waste (Coir dust) to energy chemicals and humus lime poly - condensates, Coimbatore	6.10

14.	Scheme for increasing the biomass of forest tree species by the use of mycorrhizal fungi, Uthagamandalam	0.52
15.	Chemical constituents of Neem and Karanja (Pungam) kernel, Mettupalayam	0.76
16.	Exploitation of symbiotic nitrogen fixation of actinorrhizal plants for afforestation and soil rehabilitation, Coimbatore	2.44
17.	Comprehensive scheme for estimating cost of production of principal crops, Coimbatore	31.80
18.	Scheme for Rice Processing and Allied Equipments, Coimbatore	3.00
19.	Plasticultural application and development in agricultural operation, Coimbatore	1.69
20.	Establishment of an advanced centre of training in water management technology of water technology centre, Coimbatore	2.21
21.	Technology extension project on agro-forestry in farments field, Mettupalayam	0.16
22.	Central sector scheme for integrated programme for the developement of spices. Scheme for production of foundation seed of Chillies and Minor Spices, Bhavanisagar	2.17
23.	Central sector scheme - Production of fruits and vegetables, Coimbatore, Palur, Periakulam	5.00
24.	Bio - control of soil borne diseases of national importance using fluorecent Pseudomanos, Coimbatore	12.45
25.	Technology extension project on agro-forestry, Mettupalayam	2.59
26.	Microbial consortia for biogas production from leafy biomass, Coimbatore	4.93
27.	Agro - climatic regional exercise to district level in Tamil Nadu, Coimbatore	1.35
28.	Genetic and biochemical basis of rice bacterial blight pathogen and interactions, Coimbatore	3.58

29.	Induced variability for the improvement of oilseeds and forage crops, Coimbatore	3.30
30.	Environmental risk assessment of pesticides used in a hill area, Nilgiris, Coimbatore	0.86
31.	Strenthening the existing facilities of the botanic gardens, Coimbatore	9.79
32.	Strengthening of plant quarantine facilities, Coimbatore	1.25
33.	Starting of experimental Agromt. Services, NCMRWF, Coimbatore	1.00
34.	DBT - Crop pest control by plant derivatives, Aduthurai	62.79
35.	Department of Waste Land Development - Agro Forestry operation Research Project, Tanjore	2.98
36.	Indian National Committee on Irrigation & Drainage comparative Evaluation and Economic apparaisal of different models of application of drip systems, Coimbatore	3.00
37.	DBT - Biological control approaches in the Management of Parthenium hysteraphorus	10.8
38.	Central Sector Scheme - Development of Medicinal Aeromatic Plants, Kodaikanal, Vijayanagaram	
39.	DST - Agro - Climatic resource analysis for rice production in Cauvery Delta, Aduthurai, Sirugamani (Sub Centre)	6.35
40.	DST - Regulatory mechanism of absorption factor associates with *Anaerobic cellulolytic* bacteria, Coimbatore	
41.	BRINS - Atomic Energy Regulatory Board - studies on transfer co efficient of radio nuclides from pastrue to cow's milk, Coimbatore	4.32

International Collaborative Scheme

1.	Scheme for Sesamum Research, Vridhachalam	2.60
2.	Oilseeds technology transfer package through mass campaign , video teaching, demonstration and small group approach, Coimbatore	7.28
3.	To test rice genotypes under low fertility conditions in different rice growing conditions of South and South East Asia, Coimbatore	0.70
4.	Net work collaborative research on green manure development and utilisation for rice based cropping systems, coimbatore	1.50
5.	Research project in collaboration with IFFRI - Transfer of agricultural technology and dynamics of information flows with in the technology sector, Coimbatore	0.01
6.	Rural infra structure and agricultural growth, Coimbatore	0.44
7.	Response of major surface irrigation system to drought, Coimbatore	1.00
8.	Modelling in irrigation investment, Coimbatore	1.00
9.	Management of small scale irrigation systems and ground water under constraints, Coimbatore	1.13
10.	Develpment and use of indigenous micrbial pathogens for the control of *Heliothis armigera* and *Spodoptera litura* in different cropping systems in South India, Coimbatore	7.00
11.	Studies on the utilisation of domestic and urban sewage and sludge and industrial waste for increasing crop production, Coimbatore	3.23
12.	Project for standardisation of seed production, processing and storage technology for tree crops, Coimbatore	14.99
13.	Constraints to higher rice yield in different rice growing regions in Tamil Nadu, Coimbatore	10.25
14.	Search for rice sheath blight resistance, Coimbatore	3.35
15.	Rice biotechnology programme consisting four sub projects, Coimbatore	15.03

16. Collaborative research project on improvement and utilisation of *Casuarina frankia* mycorrhizal symbiosis for afforestation and agro-forestry in India in the field of Science and Technology, Mettupalayam — 8.37

17. Measuring sustainability in long term experiments, Coimbatore — 0.73

18. Establishment of University Soil reference Centre, Coimbatore — 2.19

19. NRI-ICRISAT-TNAU-resistance monitoring on *Helicoverpa*, Coimbatore

20. IFPRI-Projection & Policy implications of medium & long term rice supply and demand, Coimbatore

21. FF Grant 920-0880-Study on the relationship between management authority & performance in Tanks in Tamil Nadu, Coimbatore

22. WINROCK-Natural Resource economics, Coimbatore

23. WINROCK-Development of Agro forestry in Tamil Nadu, Coimbatore

24. WINROCK Forestry-Neem Project network, Mettupalayam — 0.44

25. IRRI-SARP Project simulation & system analysis for Rice production, Aduthurai — 1.68

26. IRRI-SARP-Climate on rice production in India sub continent, Aduthurai — 26400 US$

27. EEC-University of Glasgow-variability & persistance of microsymbients of *Casuarina* in relation to plantation productivity in India, Mettupalayam — 28.45

28. NRI-TNAU-Development of Technology for processing & formulation of polyhydrosis virus of American Bollworm, Coimbatore — 44.62

Private Agency Schemes

1.	Scheme for strengthening coffee teaching and training for the undergraduate and postgraduate degree courses in Horticulture, Yercaud	1.53
2.	Scheme for institution of professorial Chair in Agricultural Marketing, Department of Agricultural Economics, Coimbatore	1.30
3.	Establishment of a Chair of Professor of Agronomy for Research on Fertiliser use and Management, Coimbatore	0.89
4.	Research projects for maximisation of yield in rice, Coimbatore	0.75
5.	Establishment of a Chair of Professor of Agricultural Entomology, Pesticide Toxicology, Coimbatore	1.10
6.	Studies on the multi-residues of pesticides in spices, Coimbatore and Uthagamandalam	0.59
7.	Studies on the effect of alcohol distillery effluent on soil fertility status, yield of crop produce, Coimbatore	1.91
8.	Time bound project in rural development - Participation of Rural women in Development and Economics of small scale fishing development activities, Madurai	1.66
9.	Seed fortification and mid storage treatment for prolonging shelf life of crop, Coimbatore	0.69
10.	Transfer of bio-fertilizer technology of tree crop of social forestry programme for waste land improvement in certain selected areas of Tamil Nadu, Mettupalayam and Paiyur	2.50
11.	Developing Azospirillum and Azotobactor bio-fertilizer for mulberry, Paiyur	2.20
12.	Investigation on the quantitative and qualitative increase in the yield of mulberry through mycorrihizal inoculation, Paiyur	2.92
13.	Research proposal on investigation on the Polyhedrosis virus diseases in *Bombyx mori* and their management, Coimbatore	1.56

14.	Studies on foliar application of micronutrients to mulberry and its effect on economic characters of silkworm *Bombyx mori*, Coimbatore	1.56
15.	Collaborative research project on tapioca, Palur	0.76
16.	Ecobehavioural studies on the white fly, *Bemisia tabaci* G. in polycrop ecosystem, Coimbatore	9.52
17.	SPIC Chair Endowment - Professor (Soil Science and Agricultural Chemistry) Coimbatore	1.20
18.	Medicinal plant based horti-sylviculture, Periyakulam	0.72
19.	Establishment of a pilot plant for commercial production of biological control agents, Madurai and Coimbatore	81.00
20.	Investigations on the Bacterial insecticides Bacillus (B.T.K) and its efficacy in the control of certain important crop pests, Coimbatore	0.27
21.	Evaluation of biopesticide B.T. formulations for its safety to silkworm *(Bombyx mori)*, Coimbatore	0.27
22.	Seed technological evaluation for quality in cotton, Coimbatore	0.35
23.	Monitoring and surveillance of food contaminants hazards in India, Coimbatore	0.28
24.	Scheme on investigation on the microbiology of certain fruit crop and developing suitable bio-fertilizers, Madurai	1.30
25.	Studies on continuous use of Mussorie Rock Phosphate (MRP) on normal/alkaline soils and its effect on soil crop environment, Coimbatore	0.32
26.	Evaluation of revenue oriented soil conservation and water harvesting technologies at Natrampalayam mini water shed of Dharmapuri District, Coimbatore	0.42
27.	Studies on the assessment of the problems of sea water intrusion and reclamation of the east coast in Radhapuram Taluk of Tirunelveli Kattabomman District	1.25

28.	Development, performance and evaluation of package of tractor and power tiller oriented implements for mechanisation of mulberry farm, Coimbatore	1.32
29.	Evaluation of anilofos (50% EC) residues in transplanted rice, Coimbatore	0.44
30.	Studies on anaerobic treatments of Pharma waste waters, Coimbatore	0.92
31.	Biological evaluation and determination of residues of Ekalux 20 EW, Coimbatore	0.37
32.	Endowment for research on biocontrol agents, Coimbatore	0.63
33.	Application of small portable engines in farm machines suitable to Indian Conditions, Coimbatore	1.08
34.	TNSC ST-student project seed village concept for generation system of seed production, Coimbatore	0.05
35.	TNSC ST-Student project guidelines for maintaining purity and seed quality, Coimbatore	0.05
36.	Indian Bank-Pilot project on transfer of Technology in Shevroy hills, HRS, Yercaud	0.30
37.	Potash Res. Institute of India - Studies on the effect of Potash applications for early drought management in sugarcane, Coimbatore	0.58
38.	All India Bone Millers Association New Delhi - Evaluation of raw bone meal as phosphatic source for crops of different soils, Coimbatore	1.00
39.	SANDOZ - India Limited - Evaluation of SAN - 6538 I - 230 CS 045 against cotton pest, Coimbatore	1.50
40.	Society for social Forestry Research and development - A socio Economic analysis of charcocil production in Tamil Nadu Mettupalayam.	2.54
41.	Coffee Board - Improvement of Coffee processing equipments, Coimbatore	3.00

42.	ASPEE - Bombay - Influence spraying system on the efficacy of insecticides against Bollworm of cotton, Coimbatore	0.23
43.	Endowment in Botonical pesticides, Coimbatore	4.43
44.	M/s. Potash & Phosphate Institute of Canada India Programme - strengthening of Research on Phosphorous soil fertility management, Coimbatore	4.40
45.	Society for social Forestry Research and Development - Exploiting Mycrohizae for neem nursery, Coimbatore	1.05
46.	State Department of Forest - Study for Pest and disease in testing seed and seedlings of Forestry crops and evolving suitable measures for their control, Mettupalayam	2.00
47.	Physcial Research Lab. Ahmedabad. Methane flux management from Paddy soil Ecosystem, Coimbatore	1.60
48.	Tamil Nadu Newsprint and Paper Limited, Tiruchi - Characterisation of biobleaching ensyme and standardisation of production, Coimbatore	1.20
49.	CSB-Studies on the bio-ecology and management of phyto-parasitic nematodes association with mulberry, Coimbatore	4.93
50.	TNPL-Evaluation of long term effect on utilization of effluent waste for irrigation, Coimbatore	6.34
51.	White House Process - Madras - Evaluation of Textile Mill effluent, Tirur	5.30
52.	All India Areaca Growers' Association, Design & Development of sprayer for Areca plantation, Coimbatore	2.00
53.	Sakthi Sugars - Studies on the distilleries effluent based compost and its utility, Coimbatore	6.32
54.	Tunis Rock Phosphate, Coimbatore	0.63
55.	AFPRO - Utilisation of Bio-gas for heating and power generation, Coimbatore	
56.	Raj Phos - Studies on low grade Udaipur Rock Phosphate, Coimbatore	3.28

State Government Schemes

1.	On farm water management studies, Bhavanisagar	3.68
2.	Strengthening of State Land Use Board in Tamil Nadu Agricultural University, Nucleus Cell, Coimbatore	1.75
3.	Production and distribution of vegetative hedge, fodder crops and fruit seedlings and providing training, Aruppukkottai	1.00
4.	Training programme on improved Chulas, Coimbatore	0.58
5.	Agricultural Development Project - Tamil Nadu (TNADP), Seed Production by Tamil Nadu Agricultural University, Kumulur, Killikulam, Vamban and Palur	49.23
6.	Agricultural Development Project - Tamil Nadu (TNADP) - Integrated Watershed Development Component, Vellore and Athur	5.75
7.	Fodder research component under - TNADP - implementation with world bank assistance - Department of Forage Crops, Coimbatore	1.00

APPENDIX III

LIST OF BOOKS/BOOKLETS PUBLISHED

English

1 Plant chemical analysis

2. AG. Tech - Dohows for physical constraints in Tamil Nadu

3. Micronutrient research in Tamil Nadu

4. Flood relief measures for dryland crops

5. Green manures in rice based cropping system

6. Palmarosa - a new commercial crop.

7. Teak cultivation

8. A guide to the management of pests and diseases of crops

9. Pests of field crops and their management

10. Introduction to spices, plantation crops, medicinal and aromatic plants

11. Rice black bug

12. Diseases of horticultural and plantation crops

13. Design elements in landscape gardening

14. Principles of Plant Pathology

15. Water Management studies for the Soil and Water Management Research Institute farm

16. Micronutrients in mandarin oranges.

17. Sesame Post harvest analysis in Tamil Nadu

18. Cultivation practices for rice

19. Sorghum crop cultivation Technology

20. Cotton production technology

21. Cultivation practices for sunflower

22. Sericulture A to Z

23. Recent technologies in rice cultivation

24. Plant viruses and virus diseases of crop plants

25. A hand book on field crop diseases

26. Indian liberalisation policies and opportunities for agricultural exports

27. Biofertilizers for rice

28. Experimental technique of Azolla biofertilizers

29. Reading manual on extension administration

30. Green manures in rice based cropping system

31. Weed management in cropping systems in Tambiraparani command area.

32. Agricultural Meteorology

33. Rural Sociology in Extension Education

34. Rural Sociology and Psychology in Extension Education

35. Techniques and aids in Engineering Extension

36. Forest and Tribal Welfare

37. Extension teaching methods

38. Audio-visuals in Extension Education

39. A guide to the management of pests and diseases of crops

40. Crop Diseases - Innovative techniques and management

Tamil

1. மண்ணிற்கும் மகசூலுக்கும் ஏற்ற சமசீர் உரமிடல்
2. மலைத் தோட்டப் பயிர்களுக்கு உயிர் உரங்கள் இடுதல்
3. ஆரஞ்சுப் பயிர்களுக்கு இலை வழி உரங்கள் இடுதல்
4. வீட்டுத் தோட்டம்
5. மானாவாரியில் வேளாண்மை
6. பயறு வகைகளில் பூச்சிகளும் அவைகளின் கட்டுபாடும்
7. முந்திரியில் அதிக மகசூல் பெற
8. மானாவாரி மற்றும் புழுதிக்கால் நெல் சாகுபடி
9. சுவைமிகு காளான்கள்
10. நெற் பயிரில் ஒருங்கிணைந்த பயிர் பாதுகாப்புசெயல்முறை விளக்கங்கள்
11. வேளாண்மையில் ஆராய்ச்சிப் படைப்புகள்
12. நிலக்கடலை சாகுபடி முறைகள்
13. தென்னை சாகுபடி முறைகள்
14. சௌசௌ காயில் ஒருங்கிணைந்த பழ ஈ கட்டுப்பாட்டு முறைகள்
15. மலைப் பயிர்களுக்கு உயிர் உரங்கள்
16. தர்பூசனி சாகுபடி முறைகள்
17. உழவர்தின விழா மலர்
18. வாழை சாகுபடி முறைகள்
19. மாதுளை சாகுபடி குறிப்புகள்
20. கொய்யா சாகுபடி முறைகள்
21. செடி முருங்கை
22. சிறுகமணி 1 வெற்றிலை
23. எள் சாகுபடி குறிப்புகள்

24. மழையாலும் வெள்ளத்தாலும் பாதிக்கப்பட்ட பயிர்கள் சேதநிலைகளும் பரிந்துரைகளும்

25. சிப்பிக்காளான்

26. வயல்களில் எலிகளைக் கட்டுப்படுத்தும் முறைகள்

27. நெல் தரிசில் மானாவாரி நிலக்கடலைச் சாகுபடி முறைகள்

28. செவ்வாழை சாகுபடி

29. காய்கறி சாகுபடி

30. பயிர் வளர்ச்சிக்கு உயிர் உரங்கள்

31. ஊட்டகப் பற்றாக்குறை நோய்கள்

32. பூச்சி நோய் கண்காணிப்பு

33. சப்போட்டா சாகுபடி

34. எலி ஒழிப்பு

35. தமிழக வேளாண்மையில் நீர் சிக்கனம்

APPENDIX IV

List of Research Papers Published

AGRICULTURE

Biochemistry

1. Gomathinayagam, P. and R. Kasthuri. 1993. Studies on seed protein and methionine in different pulses. Paper presented in Symposium on Developments in life sciences held at Aduthurai.

2. Kalaiselvi, K. and A. Manickam. 1993. Electrophoretic and chromatographic behaviour of mungbean 2S Albumin. Proc. National Symposium on Developments in Plant Molecular Biology and Genetic Engineering, Coimbatore. Dec. 29-31, 1993. P. MB 02.

3. Kasthuri, R. and S. Sadasivam. 1993. Influence of growth regulators on plant growth and grain quality in blackgram. Presented in the Natl. Symp. on Pl. Mol. Biol. and Genet. Engg. held between Dec. 29-31, 1993 at TNAU, Coimbatore.

4. Kasthuri, R. and S. Sadasivam. 1993. Correlation studies between methionine and protein contents in different pulses. Paper presented in National Symposium on developments in Plant Molecular Biology and Gen. Engg. held at TNAU Dec. 29-31.

5. Kasthuri, R. and S. Sadasivam. 1993. Evaluation of different plant species for renewable sources of energy. Paper presented in National Symposium on developments in Plant Molecular Biology and Gen Engg held at TNAU Dec. 29-31.

6. Kasthuri, R. and S. Sadasivam. 1993. Protein profile during germination in Horsegram. Paper presented in National Symposium on Developments in Plant Molecular Biology and Gen. Engg held at TNAU Dec. 29-31.

7. Krishnaveni, S., S. Sadasivam and T. Ramanathan 1993. Determination of oil content in wide line Nuclear Magnetic Resonance Analyser. Paper presented in National Symposium on 'Oilseeds Research and Development in India; Status and strategies', Aug. 2-5, 1993, Hyderabad.

8. Krishnaveni, S. and S. Sadasivam. 1993. Characterisation of storage proteins of sunflower. National Symposium on Oilseed Research and Development in India : Status and Strategies, Aug. 2-5, 1993, Hyderabad.

9. Krishnaveni, S., S. Sadasivam and S.R. Sree Rangasamy. 1993. Effect of *Alternaria helianthi* on seed yield and oil content of sunflower. National Symposium on Developments in Molecular Biology and Genetic Engineering. Dec. 29-31, 1993.

10. Krishnaveni, S. and A. Manickam. 1993. Electrophoretic characterization of proteins in developing seeds of Guar Seeds. "National Symposium on Development in Molecular Biology and Genetic Engineering". Dec. 29-31, 1993.

11. Krishnaveni, S., A. Nirmalakumari, S.R. Sree Rangasamy and S. Sadasivam. 1993. Factors influencing *Agrobacterium* mediated transformation in tobacco. National Symposium on Developments in Molecular Biology and Plant Genetic Engineering. Dec. 29-31. 1993.

12. Krishnaveni, S. and S. Sadasivam. 1994. Synthesis and accumulation of storage proteins in sunflower. Paper presented in National Symposium on Newer Challenges in Horticulture, Agriculture and Industry. Jan. 10-13, Bangalore.

13. Krishnaveni, S., A. Nirmalakumari, S.R. Sree Rangasamy and S. Sadasivam. 1994. Genetic transformation of tomato using *Agrobacterium tumefaciens* as a versatile vector. National Symposium on 'Frontiers in Plant Science Research' Feb. 13-14, 1994.

14. Lambodar Behera and B. Thayumanavan. 1993. Carboxylesterase from *Helicoverpa armigera* (Hubner) National Symposium on Developments in Molecular Biology and Genetic Engineering. Dec 29-31, 1993.

15. Parvathy, K., L. Narayanan and L. Gothandapani. 1993. Purification and quality assessment of leaf protein from Lucerne. Presented in the National Symposium on 'Plant Molecular Biology and Genetic Engineering' held between Dec. 29-31, 1993 at TNAU, Coimbatore-3.

16. Parvathy, K. and B. Thayumanavan. 1993. A comparative study on storage proteins of minor millets. Presented in the National Symposium on 'Plant Molecular Biology and Genetic Engineering' held between Dec. 29-31, 1993 at TNAU, Coimbatore.

17. Sadasivam, S., S. Krishnaveni and P.M. Lakshmi. 1993. Glycosidase inhibitors from plant sources. *J. Ecobiol.* 5(1) 051-054.

18. Senthil, M., K. Kalaiselvi, A. Manickam, S. Palanisamy and S.R. Sree Rangasamy. 1993. Anther proteins profile in cytoplasmic genetic male sterile and fertile sorghum. National Symposium on Developments in Plant Mol. Bio. and Genetic Engineering, Coimbatore. Dec. 29-31, P. MB 03.

19. Thayumanavan, B. and S. Uthamasamy. 1993. Glutathione S-transferase and carboxylesterase activities in aphid (*Aphis gossipii Glover*) fed on cotton leaves treated with synthetic pyrethroids. *Indian H. Expt. Biol.* 31:788-789.

20. Thayumanavan, B. 1993. Salinity induced changes in lipid peroxidation and oxidative enzymes in paddy plants. Presented in the National Symposium on Plant Molecular Biology and Genetic Engineering held between Dec. 29-31 1993 at TNAU, Coimbatore.

21. Thayumanavan, B., A. Subramanian and R. Velusamy. 1993. Foliar enzyme levels and leaffolder resistance in paddy plants. National Symposium on 'Plant Molecular Biology and Genetic Engineering' held between Dec. 29-31, 1993 at TNAU, Coimbatore.

Agricultural Botany

1. Arumugachamy, S., S. Vairavan, P. Vivekanandan and S. Palanisamy. 1992. Aromatic and quality rice improvement in Tamil Nadu. *IRRN* 17(6): 11.

2. Arumugachamy, S., P. Vivekanandan and M. Subramanian. 1993. Character association and path Coefficient analysis in ratoon rice. *Oryza*, 30: 30-32.

3. Arjunan, A., K. Balakrishnan and C. Rajendran. 1993. Non destructive method of measuring volume and weight of papaya fruit. *Madras agric. J.* 80(1): 21-23.

4. Arumugachamy. S., P. Vivekanandan and M. Subramanian. 1993. Genetics of ratooning ability in rice *(Oryza sativa)*. Accepted for publication in Egyptian journal of Genetics and cytology, Egypt.

5. Arumugam Pillai, M., M. Subramanian and S. Murugan. 1993. Effectiveness and efficiency of gamma rays and EMB for chloropence mutants in upland rice. *Ann. agric. Res.* 143(3): 302-305.

6. Arumugam Pillai, M. and M. Subramanian. 1990. Induced lodging resistance in upland rice (FAO) *Mutation Breeding Newsl.* 36, June.

7. Arumugam Pillai, M., M. Subramanian and S. Murugan. 1993. Effectiveness and deficiency of gamma rays and EMS for viable Mutants in upland rice. *J. Mendel.* 10(1): 27-28.

8. Arumugam Pillai, M. and M. Subramanian. 1994. Studies on mutated sector and number of initial cells in upland rice *(Oryza sativa). Ann. agric. Res.* 15(1): 72-73.

9. Balan, A and L.D. Vijendra Das. 1993. Variability in verdec. *Orissa J. of Agrl Res.* 6(1-2).

10. Chidambaram S. and P. Pothiraj. 1993. A promising Sorghum Culture "SPV.881", *TNAU Newsletter* 22(9).

11. David, P.M.M. and L.D.Vijendra Das. 1993. Varietal susceptibility of cowpea accessions to defoliaters, food pod borers and cowpea different genotypes of horsegram Maciotyloma uniflorum. (Lam) mossaic. *Ann. plant Research Resistance to Insects News Letter* 19: 40-41.

12. Dharmalingam, V., and T. Ramanathan. 1993. Combining ability for yield and its components in sesame. *Oleagineux,* 48: 421-424.

13. Ganesamurthy, K., P. Ramasamy, R. Gnanam, P. Sivasubramanian, U. Selvaraj, P. Rangasamy, R. Rathnaswamy and S.R. Sree Rangasamy. 1993. Co 12 - A short duration bushy Avarai variety. *Madras Agric.* J., 80: (5): 245-247.

14. Geetha, S., A.P.M. Kirubakaran, K. Natarajamoorthy, S. Palanisamy and A. Abdul Kareem. 1993. Path analysis in green gram genotypes in rice fallow situations. *Crop Res.,* 6(3) 557-559.

15. Govindaraj, P. and M. Subramanian. 1992. Resistance study on yellow mosaic virus in blackgram. *Agri. Sci. Digest,* 12(3): 132-134.

16. Jebaraj, S. and M. Subramanian. 1993. Inheritance of resistance to white backed plant hopper in rice. *Ann. Pl. Res. Insec. Newsl.,* 19: 95.

17. Krishnadoss, D., T.S. Raveendran and U. Selvaraj. 1993. TCHB 213, a high yielding interspecific hybrid cotton for Tamil Nadu, *Hybrid cotton Newsletter*, 2(1): 5.

18. Koodalingam, K., N. Mohammed Sheriff, N.R. Mahadevan and S. Jebaraj. 1993. Evaluation of M, ST and PST entries of cotton against leaf hopper and stem weevil. *Annual Plant Resistance to insects Newsletter*, 19:60.

19. Koodalingam, K. and A. Ramalingam. 1992. Genetics of seed cotton yield and its components in medium staple cotton (Gossypium hirsutum L.), *Orissa J. Agric. Res.*, 6(1-2): 179-185.

20. Manoharan, V. and R. Sethupathi Ramalingam. 1992. Inheritance of testa colour and pod reticulation in groundnut. *Madras Agric. J.*, 79(11): 646-648.

21. Manoharan, V., R. Sethupathi Ramalingam and S. Thangavelu. 1993. Heritability and genetic advance of some quantitative traits in spanish bunch groundnuts. *Madras Agric. J.*, 80:37-39.

22. Manoharan, V., S. Kalaimani, and R. Sethupathi Ramalingam. 1992. Skewness and genetic advance in two F2 populations of groundnut (Arachis hypogaea L). *Madras Agric. J.*, 79(7): 394-398.

23. Manoharan, V., S. Kalaimani and R. Sethupathi Ramalingam. 1993. Path analysis in the F2 population of an intersubspecific cross in groundnut. *Madras Agric. J.* 80(8): 472-474.

24. Mahadevan, N.R., S. Jebaraj, N. Mohammed Sheriff and K. Koodalingam. 1993. Screening of cotton germplasm for green leaf hopper and stem weevil. *Annual Plant Resistance to insects Newsletter*, 19:50.

25. Mahadevan, N.R., N. Mohammed Sheriff and K. Koodalingam. 1993. Reaction of long staple cotton genotypes to green leaf hopper. *Annual Plant resistance to insects newsletter*, 19:60.

26. Murugan, S. and M. Subramanian. 1993. Variability studies for polygenic traits in M3 and M4 generations of cowpea *(Vigna unguiculata L.). Crop Res.*, 6(2): 264-269.

27. Nilakanta Pillai, K., A. Thyagarajan, M. Subramanian, T.B. Ranganathan, K.S. Paramasivan and A. Govindan. 1993. 'TKM 10' - A new high yielding semi-dry rice to Tamil nadu. *Indian Farming*, 42, No.12

28. Nirmalakumari and M. Subramanian. 1993. Path analysis in Blackgram. *Madras agric. J.*, 80(4): 227-229.

29. Rajarathinam, S. and V.D. Guruswamy Raja. 1992. Correlation and path analysis in some rice varieties under alkaline stress. *Madras Agric. J.*, 79(7): 374-378.

30. Rajarathinam, S., K. Koodalingam and V.D. Guruswamy Raja. 1992. Effect of saline stress on the germination of rice. *Madras Agric. J.* 79(10): 595-597.

31. Rajarathinam, S., N. Nadarajan and Sukanya Subramanian. 1993. Genetic variability and association analysis in cotton. *J. Indian Soc. Cotton Improv.*, 18(1): 54-57.

32. Rajarathinam, S. and R. Rathinaswamy. 1992. Studies on combining ability in blackgram. *Madras Agric. J.*, 79(8): 436-439.

33. Rangasamy, M., K. Mohanasundaram, M. Subramanian, W. Wilfred Manuel, T. Sundaram, K. Ganesan, A. Ithayarajan and S. Vairavan. 1992. ASD 17: a short duration red rice variety for tail end areas of Thambirabarani delta and Kanyakumari district. *Madras Agric. J.*, 79(2): 62-65.

34. Ramalingam, J., P. Vivekanandan and C. Vanniarajan. 1992. Combining ability analysis in lowland early rice. *Crop Res.*, 6(2): 228-233.

35. Ramalingam, J., P. Vivekanandan and M. Subramanian. 1993. Combining ability in rice. *Oryza*, 30: 33-39.

36. Rajendran, C., S. Kailasam and K.M. Sundaram. 1992. Functional growth model for drymatter accumulation in sesamum. *Madras Agric. J.*, 79(4): 230-232.

37. Ramalingam, J., N. Nadarajan, R. Rangasamy and C. Vanniarajan. 1993. Genetic variability for panicle architecture in rice *Oryza sativa* L. *J. Bot.*, 10(1&2): 45-47.

38. Ramasamy, N.M. and A. Kalamani. 1993. Interspecific hybridization and tissue culture in groundnut. National seminar on oil seeds Research and Development in India. Status and strategies. August 2-5, 1993. Hyderabad.

39. Rangasamy, P. and S. Jebaraj. 1993. Crop Improvement in sorghum and maize. Proceedings of the papers presented in the State Level Training Programme on Millet Production held on 27-29th October, 1993.

40. Rangasamy, M., K. Mohanasundaram, M. Subramanian, W. Wilfred Manual, T. Sundaram, K. Ganesan, A. Ithayarajan and S. Vairavan. 1992. A short duration red rice variety for areas of Thamiraparani delta and Kanyakumari district. *Madras Agric. J.*, 79(2): 62-66.

41. Ramalingam, A., M. Maheswaran, M. Subramanian, A. Amirtha Deva Rathinam, Sukanya Subramanian and G. Soundarapandian. 1993. Cold tolerant MDU.4 Rice is suitable for Tamil Nadu. *Indian Farming*, 43 No.2 May, 1993. P-3-5.

42. Rajarathinam, S., K. Koodalingam and V.D. Gurusamy Raja. 1992. Effect of Saline stress on the germination of rice. *Madras Agric. J.*, 79(10): 595-597.

43. Ramasamy, P., Sukanya Subramanian, N. Sivasamy and K. Balakrishnan. 1993. Studies on regrowth rate in relation to fodder yield in Cumbu-Napier Hybrids. *Madras Agric. J.*, 80(3): 152-155.

44. Ramanathan, T. and T.K. Ramachandran. 1993. Evaluation of VCH 1, Coconut hybrids in farmers field. *Indian Coconut Journal*, 24(5): 10-12.

45. Robin, S., and M. Subramanian. 1993. Studies on the shift in association of characters in biparental progenies of Maize *(Zea mays. L). Crop Res.*, 6(2): 243-246.

46. Sankarapandian, R., D. Krishnadoss, N. Muppidathi and S. Chidambram. 1993. Variability studies in grain sorghum for certain physiological characters under water stress conditions. *Crop Improv.*, 20(1): 45-50.

47. Thirumeni, S., and L.D. Vijendra Das. 1993. Correlation studies of Pearl millet x napier grass hybrids. *Madras agric. J.*, 80(3): 165-167.

48. Vijendra Das, L.D. 1993. Genetic variability in pearl millet, Napier grass and their hybrids in quality traits. *Annals of Agrl. Res.* 15(1).

49. Vijendra Das, L.D. 1993. Cytology of some Cenchrus grasses. *'The nucleus'* 36(1&2): 68-72.

50. Vijendra Das, L.D. and A. Alwar Arunachalam. 1993. Effect of green manure on rice crop in Tambirabarani basin area. Proc. 80th session of *Indian Science Congress* Goa. 3-8 January, 93 P. 155.

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